

Component No OLH249		Component Designation: OLH249	Irradiation Spec. No.: ESCC 22900 Issue 4
Gen. Spec.: -- Det. Spec.: MFR Datasheet Amend.: --		Evaluation: X Acceptance Wafer: - Acceptance Lot: -	Project/Programme: LDT (ESA) AO / 1-6172 / 09 / F / WE
Family: 18	Group: 01	Functional Assignment: Radiation Tolerant Phototransistor Hermetic Optocoupler	Package: TO-5
Manuf.Name: ISOLINK Address: USA		Test House: ATN Address: SEVILLA (SPAIN)	Orig.house: ATN Address: SEVILLA (SPAIN)
Radiation Test Plan No.: ATGSP-RP-75 Iss1		Sample Size: 22 Irradiation Devices: 20 Control Devices: 2	Date Code: 0942 Diffusion Lot: See summary. Diffusion Run: See summary. Wafer Lot: See summary.
Radiation Source: Cobalt-60 Facility Name: ESA (ESTEC) Address: NOORDWIJK (HOLLAND)		Energy: 1.33/1.17 MeV Dose Rate: 35.4 & 323.7 rad(Si)/h	Interest level: 100krad(Si) Maximum Test Level: 100krad(Si)
Irradiation Conditions: Biased: X (10 samples) Unbiased: X (10 samples) Test Circuit: Figure 1		Irradiation Measurements Interval: Remote test: X In situ Test: --	Annealing Tests: 24h@25°C, 168h@100°C Biased: X (10 samples) Unbiased: X (10 samples) Test Circuit: Figure 1

Electrical Measurements. Parameters Tested:

$I_{C(ON)}$, $V_{CE(sat)}$, $I_{CE(OFF)}$, V_F , I_R , CTR1, CTR2, CTR3, CTR4, CTR5, CTR6, CTR7.

Prepared by.: Antonio Romero Mallén
Date: 2012/11/12
Signature:



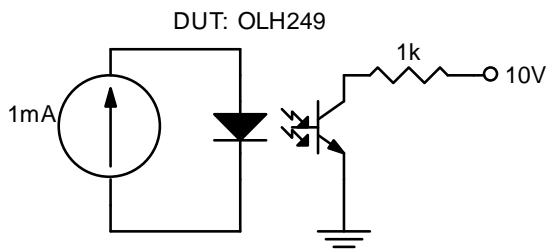
Approved by.: Eugenio Muñoz Plaza
Date: 2012/11/12
Signature:



DOCUMENT CHANGE CONTROL

Edition / Revision	Date	Affected Edition / Revision	Affected Paragraph / Modification
ATN-RR-002/2012 Iss.1	2012/07/10	--	First edition of this document.
ATN-RR-002/2012 Iss.2	2012/11/12	ATN-RR-002/2012 Iss.1	Footer on the pages updated with new issue of document format. Company's logo updated. Test house name updated. Electrical measurements at room temperature conditions included as ANNEX III.

FIGURE 1.-RADIATION BIAS CIRCUITS



Notes:

1. Ten parts (5 ELDR+5 LDR) were irradiated biased ON, in accordance with the radiation bias circuit shown in Figure 1.
2. Ten parts (5 ELDR + 5 LDR) were irradiated biased OFF: the pins are short circuited and connected to ground.

SUMMARY

In order to evaluate the behaviour of the samples between ELDR, LDR, ON and OFF biased, a total dose steady-state irradiation test has been carried out on a Radiation Tolerant Phototransistor Hermetic Optocoupler, OLH249, manufactured by ISOLINK, USA. The test was performed using two dose rate (35.4 rad(Si)/h and 323.7rad (Si)/h) until a total accumulated dose of 100krad(Si). The irradiated parts were labelled as follows:

Serial Number	Bias condition	Dose rate
R1	Control device	ELDR
R2	ON	
R3		
R4		
R5		
R6		
R7	OFF	
R8		
R9		
R10		
R11		
R1	Control device	LDR
R2	ON	
R3		
R4		
R5		
R6		
R7	OFF	
R8		
R9		
R10		
R11		

WAFER LOT NUMBER

LED: CRH32, WAFER LOT# 76286, WAFER# 08B
DET: OI1527, WAFER LOT# V003/2, WAFER# 17

RESULTS

The next table shows a resume of the irradiation test results.

ELDR									
	0Krad	6Krad	13Krad	20Krad	30Krad	50Krad	100Krad	ANN24	ANN168
$I_{C(ON)}$	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
$V_{CE(SAT)}$	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
$I_{CE(OFF)}$	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
V_F	See Note 1								
I_R	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
CTR1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
CTR2	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
CTR3	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
CTR4	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
CTR5	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
CTR6	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
CTR7	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
LDR									
	0Krad	6Krad	13Krad	20Krad	30Krad	50Krad	100Krad	ANN24	ANN168
$I_{C(ON)}$	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
$V_{CE(SAT)}$	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
$I_{CE(OFF)}$	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
V_F	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
I_R	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
CTR1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
CTR2	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
CTR3	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
CTR4	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
CTR5	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
CTR6	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
CTR7	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS

The values measured and graphs with the evolution of the previous parameters during the irradiation test and annealing sequence are available in ANNEX I.

Note 1: The results obtained in the serial numbers 6, 7, 8 and 9 from ELDR test are slightly below from the minimum limit during all irradiation steps. These results have not been considered as fails due to the fact that no deviation is observed with the accumulative dose rate.

CONCLUSION

The results obtained during the irradiation test, show that this lot is sensitive to the cumulative radiation dose when tested at dose rates of 35.4 rad(Si)/h and 323.7 rad(Si)/h up to a cumulative dose of 100krad(Si).

The most affected parameters are the IC(ON), VCE(SAT) and the CTR's but they remain within specification limits. The samples tend to recover their initial values during the annealing process.

-IC(ON): The results show a higher degradation in the samples biased OFF than the biased ON. A slight difference between LDR and ELDR in the samples biased On is observed from 50krad onwards.

-VCE(SAT): The results show a higher degradation in the samples biased OFF than the biased ON. A slight difference between LDR and ELDR in the samples biased On is observed from 100krad onwards.

CTR's: The results show a higher degradation in the samples biased OFF than the biased ON. A slight difference between LDR and ELDR in the samples biased On is observed from 50krad onwards.

For the rest of the parameters, it is not observed a clear differentiate behaviour between ELDR, LDR, On and Off biased parts

SCHEDULE

ELDR Average Dose Rate (1)	LDR Average Dose Rate (2)	Cummulative ELDR Total Dose	ELDR Measurement date	Cummulative LDR Total Dose	LDR Measurement date	Step Deviation ELDR vs LDR (%)
rad(Si)/h	rad(Si)/h	krad(Si)	--	krad(Si)	--	
--	--	0	2012/02/15	0	2012/06/04	--
35.41	323.7	5240	2012/02/21	5707	2012/06/05	8.9
		12168	2012/02/29	13362	2012/06/06	9.8
		19201	2012/03/08	20644	2012/06/07	7.5
		28612	2012/03/19	28167	2012/06/08	-1.5
		48417	2012/04/11	48498	2012/06/11	0.1
		106074	2012/06/18	102360	2012/06/18	-3.7
Annealing						
ann24h @25°C	24	--	2012/06/19	--	2012/06/19	
ann168h @100°C	168	--	2012/06/26	--	2012/06/26	

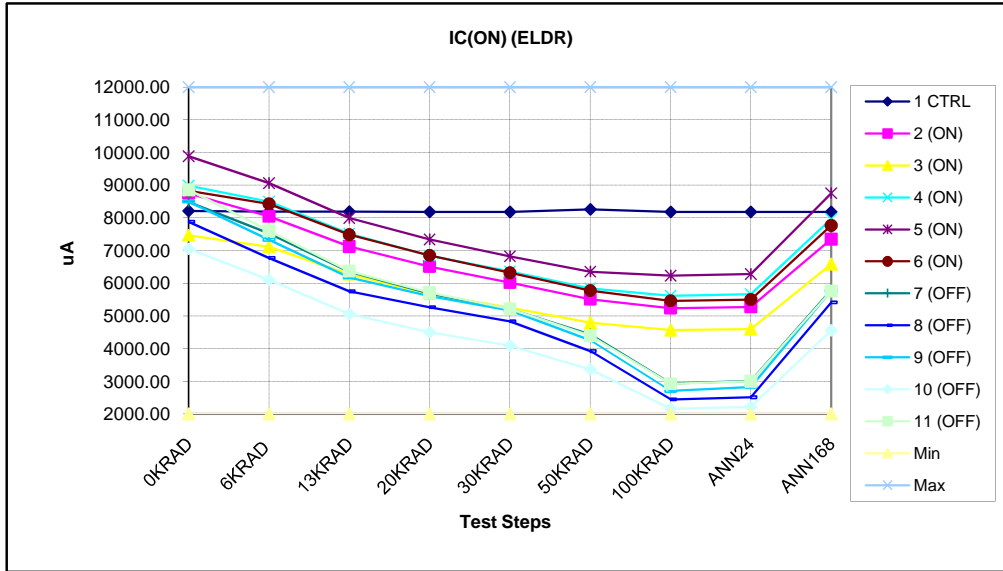
(1) The minimum and maximum dose rate registered were 18.6rad (Si)/h and 38.9rad (Si)/h respectively.

(2) The minimum and maximum dose rate registered were 271.2 rad(Si)/h and 360.6 rad(Si)/h respectively.

ELECTRICAL MEASUREMENTS EQUIPMENT LIST

REF INVENT	DESCRIPTION	MFR	MODEL	CALIBRATION DUE	USAGE
LE0304.000	UNIVERSAL TEST SYSTEM	SZ	M-3000	2012/08/15	0,6,13,20,35,50,100Krad, ANN24, ANN168
LE0393.003	TEST ADAPTER	SZ	UNIVERSAL FRONT ADAPTER	--	0,6,13,20,35,50,100Krad, ANN24, ANN168
LE080.008	TEST ADAPTER	SZ	TA06B	--	0,6,13,20,35,50,100Krad, ANN24, ANN168
LE0400.000	HIGH RESISTANCE METER	AGILENT	4339B	2012/09/21	0,6,13,20,35,50,100Krad, ANN24, ANN168

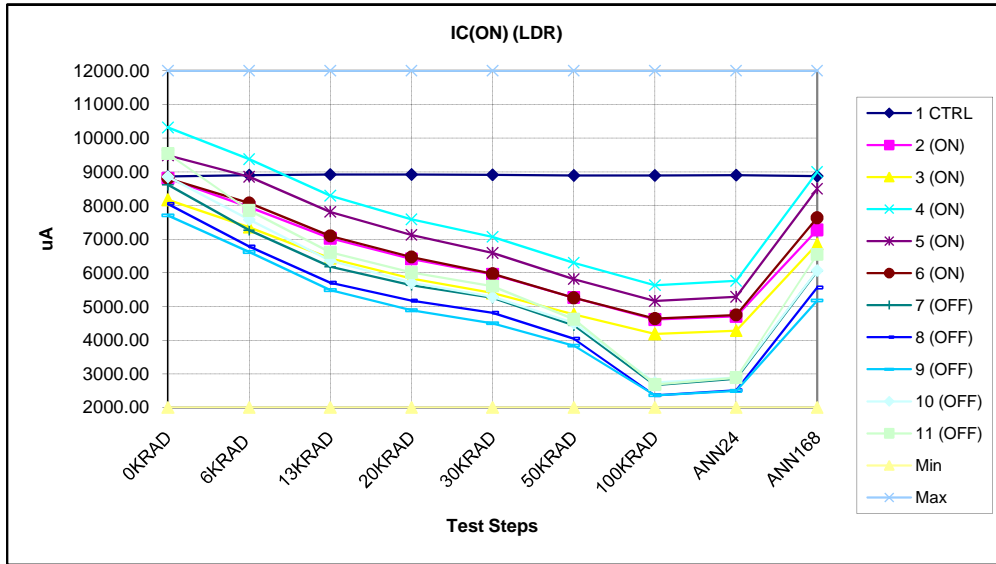
ANNEX I ELECTRICAL MEASUREMENTS GRAPHS



IC(ON) (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	2000	2000	2000	2000	2000	2000	2000	2000	2000
Max	12000	12000	12000	12000	12000	12000	12000	12000	12000
Unit	uA	uA	uA	uA	uA	uA	uA	uA	uA
Control Results									
1 CTRL	8210.7	8196.0	8193.0	8187.2	8181.0	8262.4	8183.4	8182.2	8181.2

Bias on results									
2 (ON)	8750.9	8047.2	7124.2	6509.5	6021.5	5509.4	5239.0	5276.0	7345.9
3 (ON)	7467.7	7116.9	6273.7	5676.7	5254.7	4793.0	4565.0	4597.7	6583.4
4 (ON)	8986.4	8495.2	7521.9	6844.9	6358.5	5839.7	5621.2	5661.7	7966.7
5 (ON)	9885.5	9060.7	7995.5	7337.9	6821.7	6351.9	6230.9	6279.7	8753.2
6 (ON)	8828.9	8432.7	7486.0	6850.9	6321.5	5778.7	5463.2	5504.2	7767.4
Statistics bias on									
min result	7467.7	7116.9	6273.7	5676.7	5254.7	4793.0	4565.0	4597.7	6583.4
max result	9885.5	9060.7	7995.5	7337.9	6821.7	6351.9	6230.9	6279.7	8753.2
average	8783.8	8230.5	7280.2	6643.9	6155.6	5654.5	5423.8	5463.8	7683.3
sigma	864.6	720.0	642.2	616.1	579.2	569.9	604.9	610.7	799.3

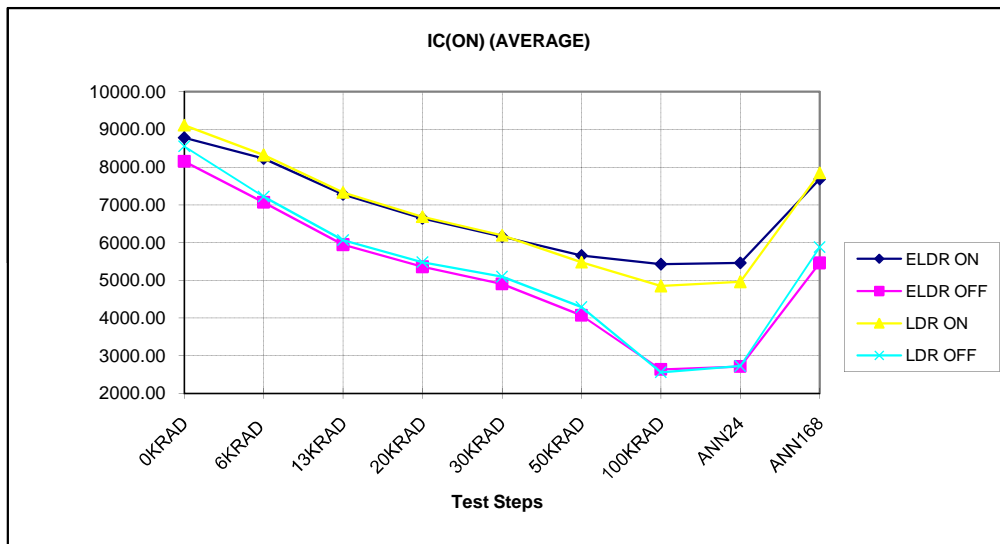
Bias off results									
7 (OFF)	8490.7	7524.5	6352.0	5686.5	5205.5	4427.9	2933.2	3016.7	5789.9
8 (OFF)	7881.0	6776.0	5752.2	5266.5	4833.7	3918.5	2446.4	2511.0	5414.4
9 (OFF)	8498.9	7329.9	6180.2	5610.5	5168.5	4258.0	2707.5	2826.7	5771.9
10 (OFF)	7052.5	6109.9	5060.2	4502.0	4091.0	3365.7	2157.2	2221.9	4563.2
11 (OFF)	8855.5	7602.7	6375.4	5713.9	5218.9	4393.9	2928.5	3000.5	5763.0
Statistics bias off									
min result	7052.5	6109.9	5060.2	4502.0	4091.0	3365.7	2157.2	2221.9	4563.2
max result	8855.5	7602.7	6375.4	5713.9	5218.9	4427.9	2933.2	3016.7	5789.9
average	8155.7	7068.6	5944.0	5355.9	4903.5	4072.8	2634.5	2715.3	5460.4
sigma	709.3	625.7	553.7	509.8	481.1	443.7	333.2	342.7	525.4



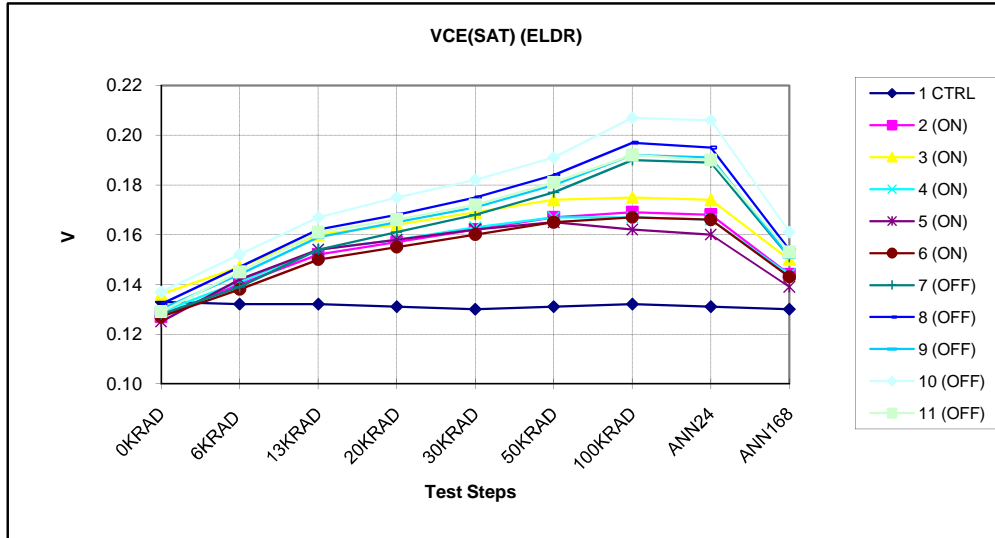
IC(ON) (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	2000	2000	2000	2000	2000	2000	2000	2000	2000
Max	12000	12000	12000	12000	12000	12000	12000	12000	12000
Unit	uA	uA	uA	uA	uA	uA	uA	uA	uA
Control Results									
1 CTRL	8863.2	8901.7	8919.2	8915.0	8909.7	8886.2	8888.7	8900.0	8876.0

Bias on results									
2 (ON)	8803.5	7951.5	7023.5	6409.7	5950.7	5263.0	4610.9	4706.0	7271.0
3 (ON)	8165.5	7354.4	6429.5	5833.0	5398.9	4763.0	4184.4	4280.7	6855.5
4 (ON)	10315.2	9374.2	8288.7	7585.7	7068.7	6299.2	5634.2	5761.4	8991.2
5 (ON)	9485.7	8850.7	7809.9	7127.0	6588.0	5815.2	5162.5	5285.4	8495.4
6 (ON)	8805.0	8071.5	7094.5	6468.4	5969.9	5254.7	4639.9	4749.4	7632.5
Statistics bias on									
min result	8165.5	7354.4	6429.5	5833.0	5398.9	4763.0	4184.4	4280.7	6855.5
max result	10315.2	9374.2	8288.7	7585.7	7068.7	6299.2	5634.2	5761.4	8991.2
average	9115.0	8320.4	7329.2	6684.7	6195.2	5479.0	4846.3	4956.5	7849.1
sigma	817.4	794.2	726.2	681.0	644.6	590.6	560.6	574.1	879.0

Bias off results									
7 (OFF)	8611.9	7267.2	6177.9	5633.9	5255.2	4437.2	2664.0	2855.4	6044.0
8 (OFF)	8046.2	6780.7	5704.2	5169.9	4815.9	4043.4	2363.0	2508.4	5561.7
9 (OFF)	7706.0	6614.4	5484.7	4884.7	4498.9	3835.7	2361.7	2490.7	5177.0
10 (OFF)	8853.4	7583.2	6362.0	5706.5	5290.5	4505.4	2741.2	2889.4	6067.2
11 (OFF)	9537.2	7849.7	6607.5	6008.7	5601.5	4620.7	2682.0	2886.9	6544.9
Statistics bias off									
min result	7706.0	6614.4	5484.7	4884.7	4498.9	3835.7	2361.7	2490.7	5177.0
max result	9537.2	7849.7	6607.5	6008.7	5601.5	4620.7	2741.2	2889.4	6544.9
average	8550.9	7219.0	6067.2	5480.7	5092.4	4288.4	2562.4	2726.1	5878.9
sigma	713.5	522.1	464.3	448.6	434.1	333.4	184.8	207.4	524.3



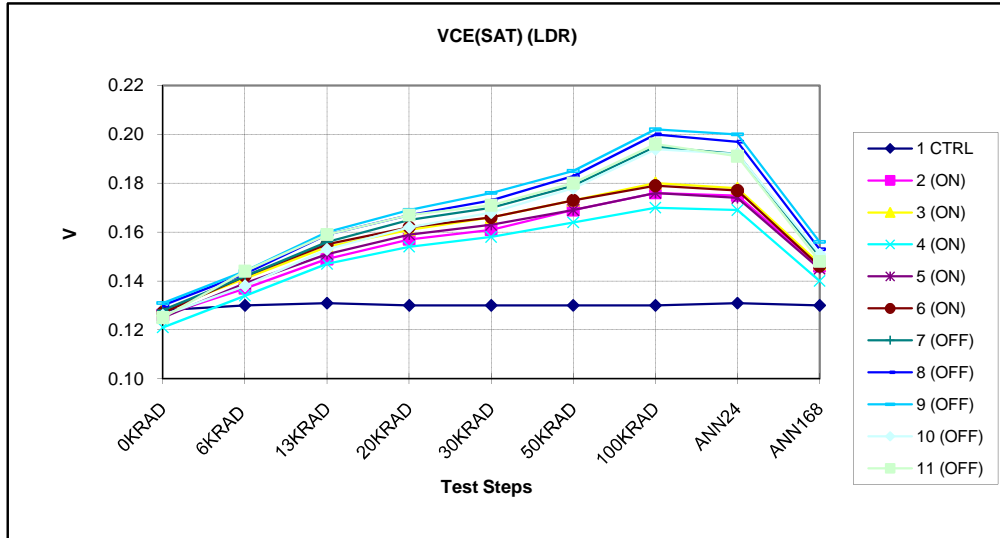
IC(ON) (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	8783.8	8230.5	7280.2	6643.9	6155.6	5654.5	5423.8	5463.8	7683.3
ELDR OFF	8155.7	7068.6	5944.0	5355.9	4903.5	4072.8	2634.5	2715.3	5460.4
LDR ON	9115.0	8320.4	7329.2	6684.7	6195.2	5479.0	4846.3	4956.5	7849.1
LDR OFF	8550.9	7219.0	6067.2	5480.7	5092.4	4288.4	2562.4	2726.1	5878.9



VCE(SAT) (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Unit	V	V	V	V	V	V	V	V	V
Control Results									
1 CTRL	0.133	0.132	0.132	0.131	0.13	0.131	0.132	0.131	0.13

Bias on results									
2 (ON)	0.127	0.14	0.152	0.157	0.162	0.167	0.169	0.168	0.144
3 (ON)	0.136	0.147	0.16	0.164	0.169	0.174	0.175	0.174	0.15
4 (ON)	0.129	0.141	0.154	0.158	0.163	0.167	0.167	0.166	0.144
5 (ON)	0.125	0.142	0.154	0.158	0.162	0.165	0.162	0.16	0.139
6 (ON)	0.127	0.138	0.15	0.155	0.16	0.165	0.167	0.166	0.143
Statistics bias on									
min result	0.125	0.138	0.150	0.155	0.160	0.165	0.162	0.160	0.139
max result	0.136	0.147	0.160	0.164	0.169	0.174	0.175	0.174	0.150
average	0.129	0.142	0.154	0.158	0.163	0.168	0.168	0.167	0.144
sigma	0.004	0.003	0.004	0.003	0.003	0.004	0.005	0.005	0.004

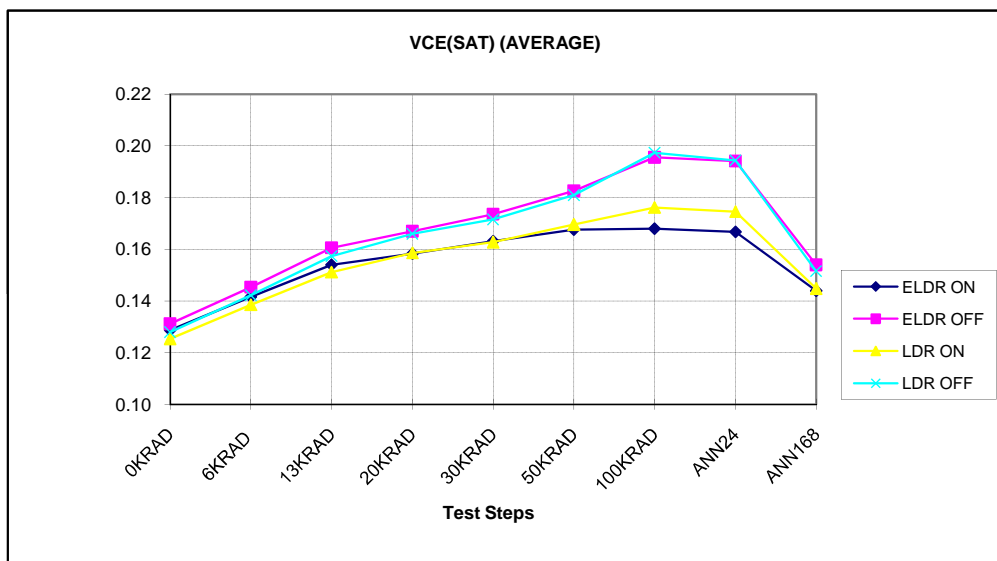
Bias off results									
7 (OFF)	0.128	0.139	0.154	0.161	0.168	0.177	0.19	0.189	0.151
8 (OFF)	0.132	0.147	0.162	0.168	0.175	0.184	0.197	0.195	0.154
9 (OFF)	0.13	0.144	0.159	0.165	0.171	0.18	0.192	0.191	0.151
10 (OFF)	0.137	0.152	0.167	0.175	0.182	0.191	0.207	0.206	0.161
11 (OFF)	0.129	0.145	0.161	0.166	0.172	0.181	0.192	0.19	0.153
Statistics bias off									
min result	0.128	0.139	0.154	0.161	0.168	0.177	0.190	0.189	0.151
max result	0.137	0.152	0.167	0.175	0.182	0.191	0.207	0.206	0.161
average	0.131	0.145	0.161	0.167	0.174	0.183	0.196	0.194	0.154
sigma	0.004	0.005	0.005	0.005	0.005	0.005	0.007	0.007	0.004



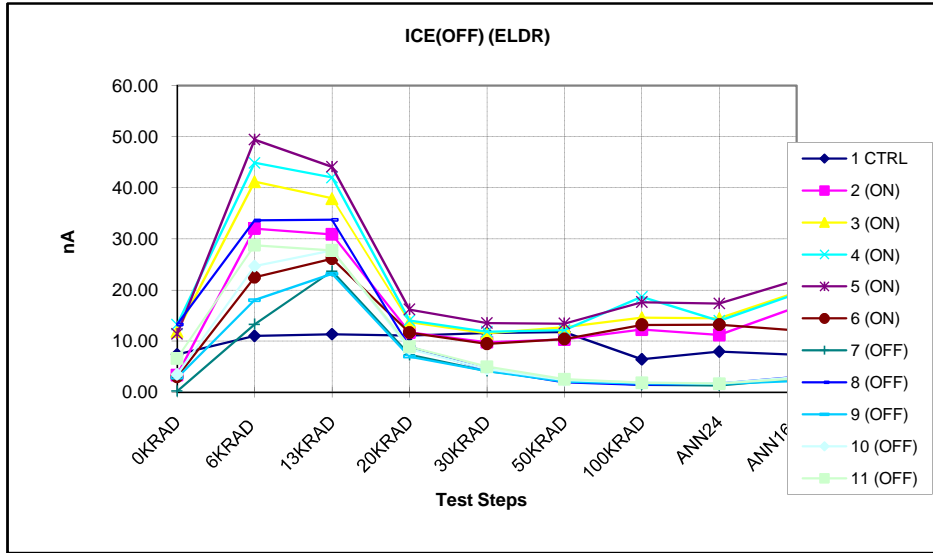
VCE(SAT) (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Unit	V	V	V	V	V	V	V	V	V
Control Results									
1 CTRL	0.128	0.130	0.131	0.130	0.130	0.130	0.130	0.131	0.130

Bias on results									
2 (ON)	0.126	0.137	0.149	0.157	0.161	0.169	0.176	0.175	0.146
3 (ON)	0.128	0.141	0.154	0.161	0.166	0.173	0.180	0.178	0.147
4 (ON)	0.121	0.134	0.147	0.154	0.158	0.164	0.170	0.169	0.140
5 (ON)	0.125	0.139	0.151	0.159	0.163	0.169	0.176	0.174	0.145
6 (ON)	0.127	0.142	0.155	0.162	0.166	0.173	0.179	0.177	0.146
Statistics bias on									
min result	0.121	0.134	0.147	0.154	0.158	0.164	0.170	0.169	0.140
max result	0.128	0.142	0.155	0.162	0.166	0.173	0.180	0.178	0.147
average	0.125	0.139	0.151	0.159	0.163	0.170	0.176	0.175	0.145
sigma	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.003

Bias off results									
7 (OFF)	0.128	0.142	0.156	0.165	0.170	0.179	0.195	0.192	0.150
8 (OFF)	0.130	0.143	0.159	0.167	0.173	0.183	0.200	0.197	0.153
9 (OFF)	0.131	0.144	0.160	0.169	0.176	0.185	0.202	0.200	0.156
10 (OFF)	0.126	0.138	0.153	0.162	0.168	0.178	0.194	0.192	0.151
11 (OFF)	0.125	0.144	0.159	0.167	0.171	0.180	0.196	0.191	0.148
Statistics bias off									
min result	0.125	0.138	0.153	0.162	0.168	0.178	0.194	0.191	0.148
max result	0.131	0.144	0.160	0.169	0.176	0.185	0.202	0.200	0.156
average	0.128	0.142	0.157	0.166	0.172	0.181	0.197	0.194	0.152
sigma	0.003	0.002	0.003	0.003	0.003	0.003	0.003	0.004	0.003



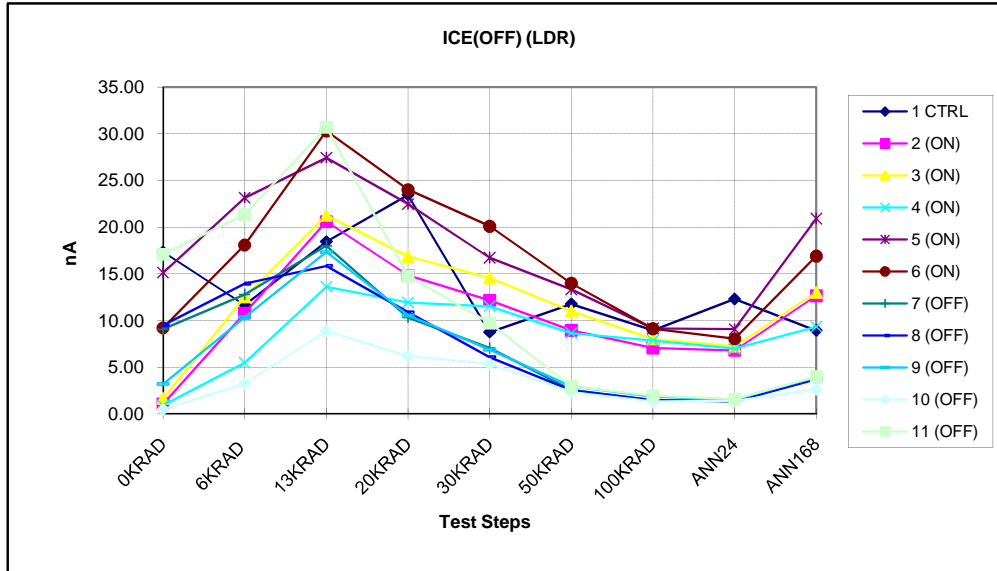
IC(ON) (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	0.129	0.142	0.154	0.158	0.163	0.168	0.168	0.167	0.144
ELDR OFF	0.131	0.145	0.161	0.167	0.174	0.183	0.196	0.194	0.154
LDR ON	0.125	0.139	0.151	0.159	0.163	0.170	0.176	0.175	0.145
LDR OFF	0.128	0.142	0.157	0.166	0.172	0.181	0.197	0.194	0.152



ICE(OFF) (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	100	100	100	100	100	100	100	100	100
Unit	nA	nA	nA	nA	nA	nA	nA	nA	nA
Control Results									
1 CTRL	7.38	11.00	11.35	11.11	11.60	11.78	6.40	7.92	7.29

Bias on results									
2 (ON)	3.36	32.00	30.90	11.68	9.78	10.31	12.25	11.21	16.66
3 (ON)	11.89	41.18	37.90	13.69	11.49	12.70	14.58	14.41	19.49
4 (ON)	13.19	44.87	42.02	14.04	11.84	12.13	18.64	13.97	19.26
5 (ON)	11.41	49.40	44.09	16.19	13.53	13.43	17.63	17.36	21.91
6 (ON)	3.01	22.51	26.13	11.67	9.49	10.40	13.18	13.22	12.11
23.65									
min result	3.01	22.51	26.13	11.67	9.49	10.31	12.25	11.21	12.11
max result	13.19	49.40	44.09	16.19	13.53	13.43	18.64	17.36	21.91
average	8.57	37.99	36.21	13.45	11.23	11.79	15.26	14.03	17.89
sigma	4.96	10.76	7.56	1.89	1.65	1.39	2.78	2.23	3.73

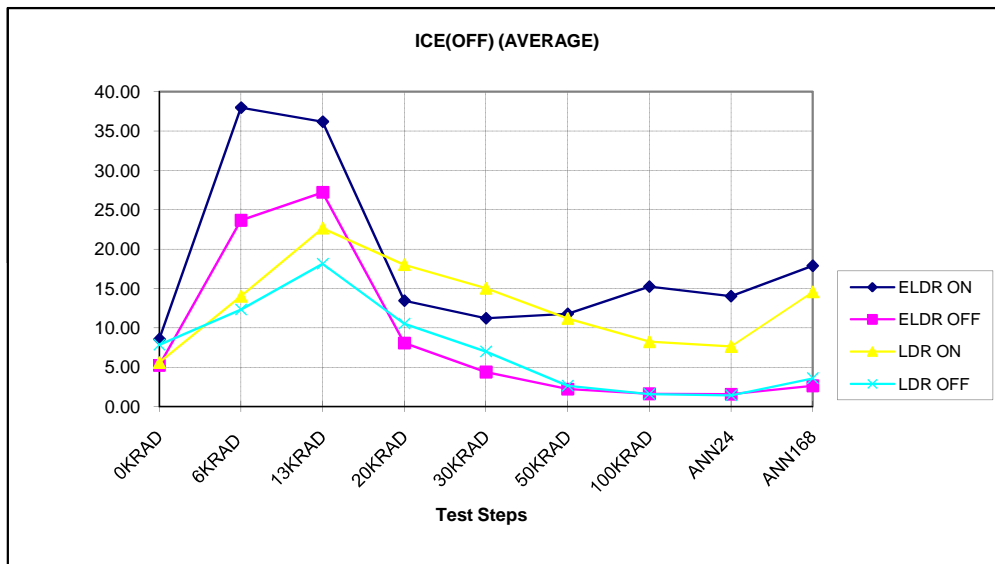
Bias off results									
7 (OFF)	0.19	13.25	23.65	7.29	4.12	2.37	1.46	1.32	2.62
8 (OFF)	13.24	33.62	33.74	8.87	4.35	1.90	1.43	1.65	2.99
9 (OFF)	2.81	17.98	23.14	6.96	4.11	2.06	1.66	1.62	2.17
10 (OFF)	3.44	24.67	27.75	8.46	4.50	2.35	1.86	1.75	2.92
11 (OFF)	6.58	28.73	27.71	8.86	4.95	2.52	1.82	1.66	2.67
Statistics bias off									
min result	0.19	13.25	23.14	6.96	4.11	1.90	1.43	1.32	2.17
max result	13.24	33.62	33.74	8.87	4.95	2.52	1.86	1.75	2.99
average	5.25	23.65	27.20	8.09	4.41	2.24	1.65	1.60	2.67
sigma	5.01	8.16	4.26	0.90	0.35	0.25	0.20	0.16	0.32



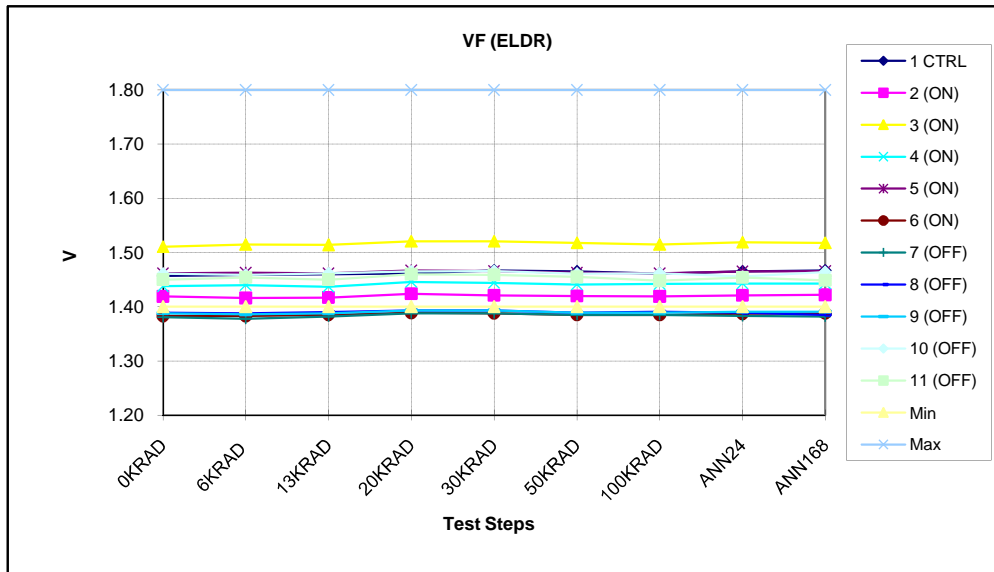
ICE(OFF) (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	100	100	100	100	100	100	100	100	100
Unit	nA	nA	nA	nA	nA	nA	nA	nA	nA
Control Results									
1 CTRL	17.35	11.68	18.46	23.47	8.76	11.78	8.97	12.31	8.94

13.02									
2 (ON)	1.08	10.79	20.60	14.83	12.17	8.95	7.06	6.80	12.66
3 (ON)	1.66	12.55	21.28	16.87	14.57	11.02	8.03	7.25	13.02
4 (ON)	0.93	5.50	13.62	11.93	11.54	8.66	7.87	6.99	9.34
5 (ON)	15.14	23.15	27.43	22.48	16.74	13.33	9.16	9.09	20.91
6 (ON)	9.21	18.09	30.30	24.02	20.11	14.00	9.13	8.06	16.91
Statistics bias on									
min result	0.93	5.50	13.62	11.93	11.54	8.66	7.06	6.80	9.34
max result	15.14	23.15	30.30	24.02	20.11	14.00	9.16	9.09	20.91
average	5.60	14.02	22.65	18.03	15.03	11.19	8.25	7.64	14.57
sigma	6.36	6.80	6.50	5.11	3.51	2.45	0.90	0.94	4.45

Bias off results									
7 (OFF)	9.07	12.79	18.01	10.33	7.06	2.57	1.47	1.37	3.87
8 (OFF)	9.50	13.96	15.86	10.90	6.09	2.55	1.47	1.34	3.71
9 (OFF)	3.21	10.37	17.35	10.56	6.89	2.96	1.88	1.56	3.93
10 (OFF)	0.48	3.26	8.87	6.21	5.36	2.33	1.33	1.42	2.64
11 (OFF)	17.11	21.34	30.71	14.79	9.75	2.96	1.95	1.59	3.99
Statistics bias off									
min result	0.48	3.26	8.87	6.21	5.36	2.33	1.33	1.34	2.64
max result	17.11	21.34	30.71	14.79	9.75	2.96	1.95	1.59	3.99
average	7.87	12.34	18.16	10.56	7.03	2.67	1.62	1.45	3.63
sigma	6.44	6.52	7.90	3.04	1.67	0.28	0.28	0.11	0.56



ICE(OFF) (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	8.57	37.99	36.21	13.45	11.23	11.79	15.26	14.03	17.89
ELDR OFF	5.25	23.65	27.20	8.09	4.41	2.24	1.65	1.60	2.67
LDR ON	5.60	14.02	22.65	18.03	15.03	11.19	8.25	7.64	14.57
LDR OFF	7.87	12.34	18.16	10.56	7.03	2.67	1.62	1.45	3.63



VF (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Max	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Unit	V	V	V	V	V	V	V	V	V

Control Results									
1 CTRL	1.457	1.459	1.460	1.462	1.467	1.465	1.461	1.465	1.467

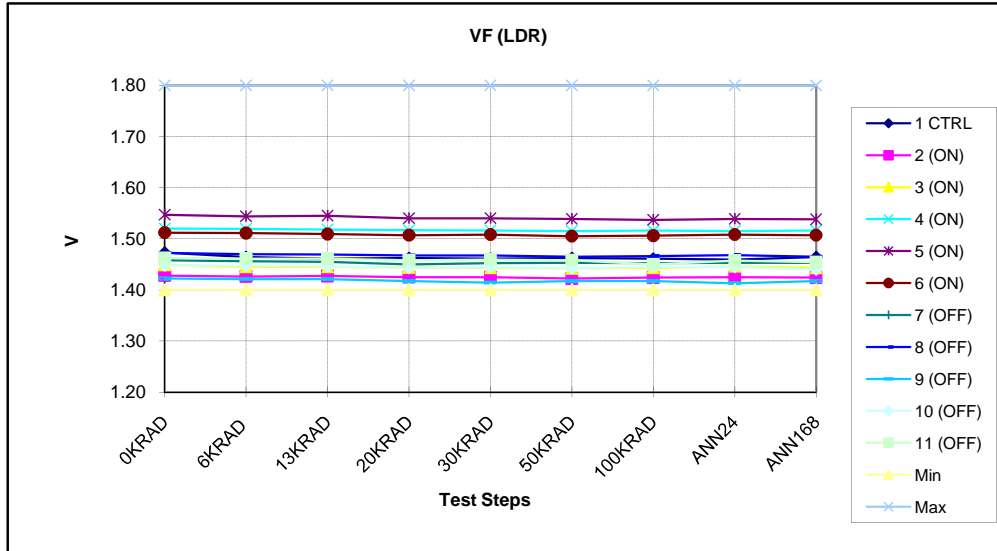
Bias on results									
2 (ON)	1.419	1.416	1.417	1.424	1.421	1.420	1.419	1.421	1.422
3 (ON)	1.511	1.515	1.514	1.521	1.521	1.518	1.515	1.519	1.518
4 (ON)	1.438	1.440	1.437	1.446	1.444	1.441	1.442	1.443	1.443
5 (ON)	1.462	1.463	1.462	1.467	1.466	1.463	1.462	1.465	1.466
6 (ON)	1.383	1.383	1.385	1.389	1.388	1.385	1.385	1.387	1.388

Statistics bias on									
min result	1.383	1.383	1.385	1.389	1.388	1.385	1.385	1.387	1.388
max result	1.511	1.515	1.514	1.521	1.521	1.518	1.515	1.519	1.518
average	1.443	1.443	1.443	1.449	1.448	1.445	1.445	1.447	1.447
sigma	0.048	0.050	0.049	0.049	0.050	0.050	0.049	0.049	0.049

Bias off results									
7 (OFF)	1.381	1.378	1.382	1.388	1.388	1.385	1.385	1.383	1.382
8 (OFF)	1.389	1.388	1.390	1.393	1.393	1.389	1.391	1.389	1.385
9 (OFF)	1.388	1.386	1.388	1.393	1.393	1.389	1.389	1.391	1.391
10 (OFF)	1.461	1.459	1.462	1.465	1.466	1.461	1.462	1.456	1.464
11 (OFF)	1.450	1.454	1.450	1.460	1.459	1.455	1.448	1.454	1.449

Statistics bias off									
min result	1.381	1.378	1.382	1.388	1.388	1.385	1.385	1.383	1.382
max result	1.461	1.459	1.462	1.465	1.466	1.461	1.462	1.456	1.464
average	1.414	1.413	1.414	1.420	1.420	1.416	1.415	1.415	1.414
sigma	0.038	0.040	0.038	0.039	0.039	0.039	0.037	0.037	0.039

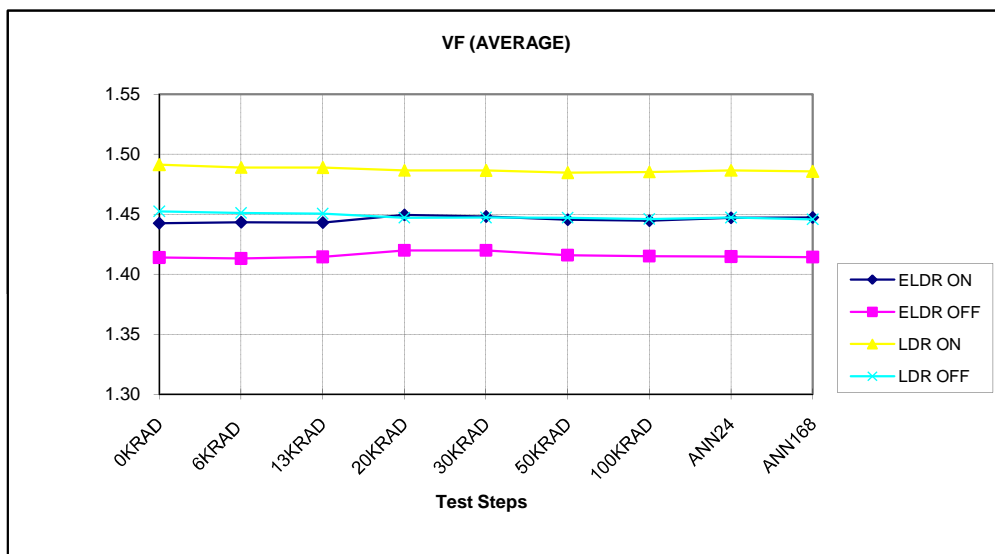
Note 1: The results obtained in the serial numbers 6, 7, 8 and 9 from ELDR test are slightly below from the minimum limit during all irradiation steps. These results have not been considered as fails due to the fact that no deviation is observed with the accumulative dose rate.



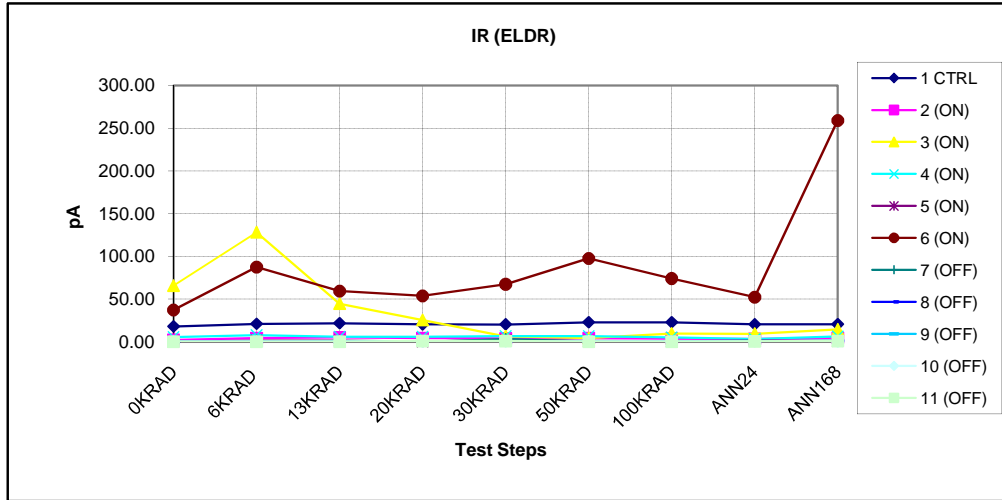
VF (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Max	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Unit	V	V	V	V	V	V	V	V	V
Control Results									
1 CTRL	1.473	1.464	1.461	1.462	1.461	1.462	1.461	1.459	1.464

Bias on results									
2 (ON)	1.428	1.426	1.427	1.425	1.425	1.422	1.424	1.425	1.424
3 (ON)	1.449	1.445	1.445	1.444	1.443	1.442	1.443	1.446	1.443
4 (ON)	1.520	1.519	1.518	1.517	1.516	1.515	1.516	1.515	1.516
5 (ON)	1.547	1.544	1.545	1.540	1.540	1.539	1.537	1.539	1.538
6 (ON)	1.512	1.511	1.509	1.507	1.508	1.505	1.506	1.508	1.507
Statistics bias on									
min result	1.428	1.426	1.427	1.425	1.425	1.422	1.424	1.425	1.424
max result	1.547	1.544	1.545	1.540	1.540	1.539	1.537	1.539	1.538
average	1.491	1.489	1.489	1.487	1.486	1.485	1.485	1.487	1.486
sigma	0.050	0.051	0.050	0.050	0.050	0.050	0.049	0.049	0.049

Bias off results									
7 (OFF)	1.458	1.456	1.455	1.450	1.452	1.453	1.452	1.453	1.453
8 (OFF)	1.472	1.470	1.469	1.467	1.467	1.465	1.466	1.468	1.465
9 (OFF)	1.422	1.421	1.421	1.417	1.414	1.417	1.417	1.413	1.417
10 (OFF)	1.448	1.447	1.446	1.443	1.444	1.442	1.445	1.445	1.440
11 (OFF)	1.462	1.461	1.461	1.458	1.459	1.458	1.450	1.457	1.454
Statistics bias off									
min result	1.422	1.421	1.421	1.417	1.414	1.417	1.417	1.413	1.417
max result	1.472	1.470	1.469	1.467	1.467	1.465	1.466	1.468	1.465
average	1.452	1.451	1.450	1.447	1.447	1.447	1.446	1.447	1.446
sigma	0.019	0.019	0.018	0.019	0.020	0.019	0.018	0.021	0.018



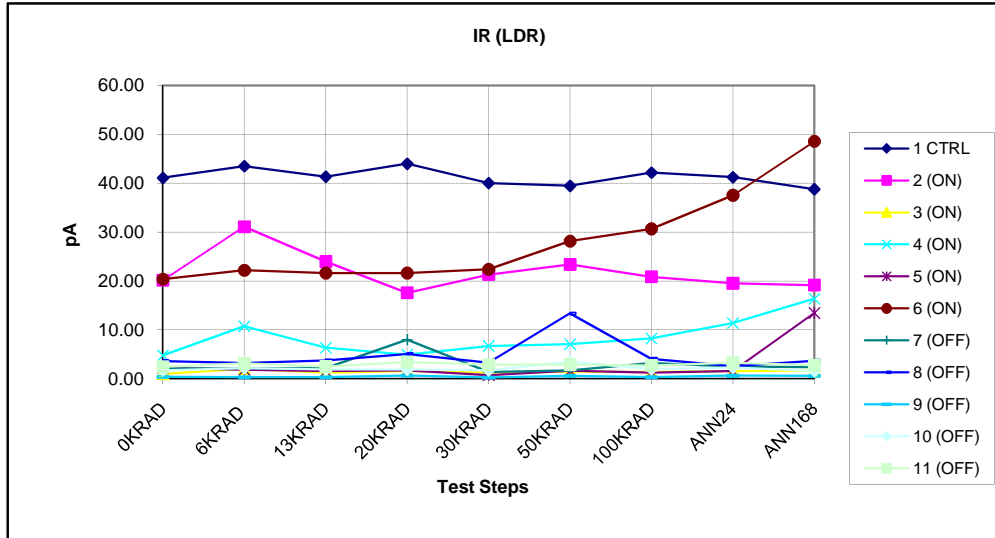
VF (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	1.443	1.443	1.443	1.449	1.448	1.445	1.445	1.447	1.447
ELDR OFF	1.414	1.413	1.414	1.420	1.420	1.416	1.415	1.415	1.414
LDR ON	1.491	1.489	1.489	1.487	1.486	1.485	1.485	1.487	1.486
LDR OFF	1.452	1.451	1.450	1.447	1.447	1.447	1.446	1.447	1.446



IR (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	100.E+06	100.E+06	100.E+06	100.E+06	100.E+06	100.E+06	100.E+06	100.E+06	100.E+06
Unit	pA	pA	pA	pA	pA	pA	pA	pA	pA
Control Results									
1 CTRL	18.0	20.9	21.7	20.5	20.4	22.9	22.9	20.5	20.5

Bias on results									
2 (ON)	2.3	4.4	5.0	4.2	4.0	4.3	3.7	3.3	4.6
3 (ON)	65.7	128.0	44.6	25.5	6.2	4.5	9.6	9.5	14.5
4 (ON)	5.5	7.9	6.1	6.0	6.7	6.8	5.2	3.4	6.5
5 (ON)	0.2	1.4	1.2	0.4	2.1	1.1	0.7	1.2	1.0
6 (ON)	37.3	87.6	59.4	53.8	67.4	97.6	74.2	52.1	259.0
Statistics bias on									
min result	0.2	1.4	1.2	0.4	2.1	1.1	0.7	1.2	1.0
max result	65.7	128.0	59.4	53.8	67.4	97.6	74.2	52.1	259.0
average	22.2	45.9	23.3	18.0	17.3	22.9	18.7	13.9	57.1
sigma	28.6	58.4	26.8	22.3	28.1	41.8	31.2	21.6	113.0

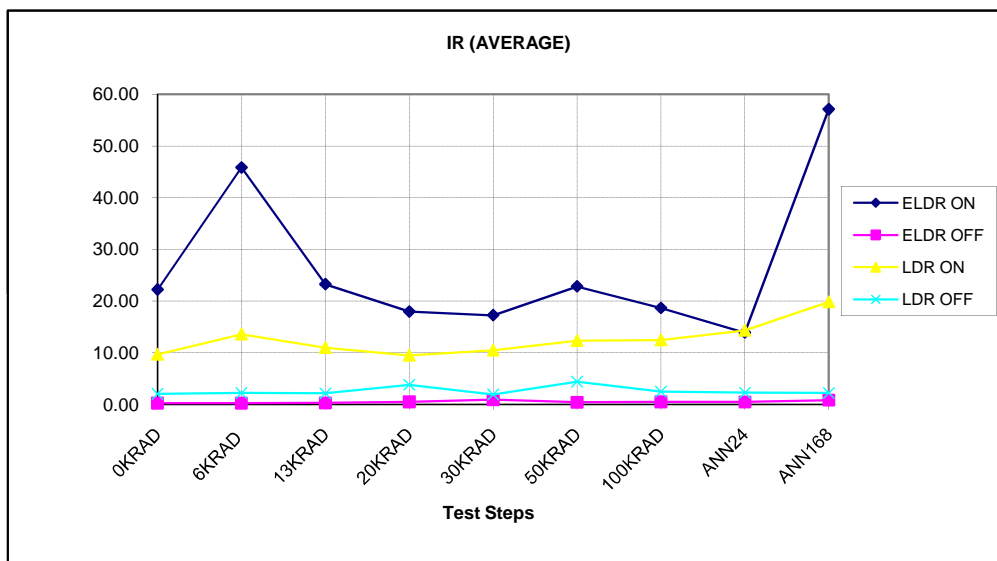
Bias off results									
7 (OFF)	0.6	0.2	0.1	0.1	3.4	0.3	0.6	0.6	0.7
8 (OFF)	0.2	0.2	0.1	0.8	0.2	0.3	0.5	0.4	0.8
9 (OFF)	0.3	0.2	0.7	0.4	0.2	0.6	0.8	0.5	1.4
10 (OFF)	0.2	0.4	0.3	0.4	0.2	0.8	0.5	0.4	0.4
11 (OFF)	0.1	0.3	0.2	0.8	0.8	0.1	0.2	0.5	0.9
Statistics bias off									
min result	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.4	0.4
max result	0.6	0.4	0.7	0.8	3.4	0.8	0.8	0.6	1.4
average	0.3	0.3	0.3	0.5	0.9	0.4	0.5	0.5	0.8
sigma	0.2	0.1	0.2	0.3	1.4	0.3	0.2	0.1	0.4



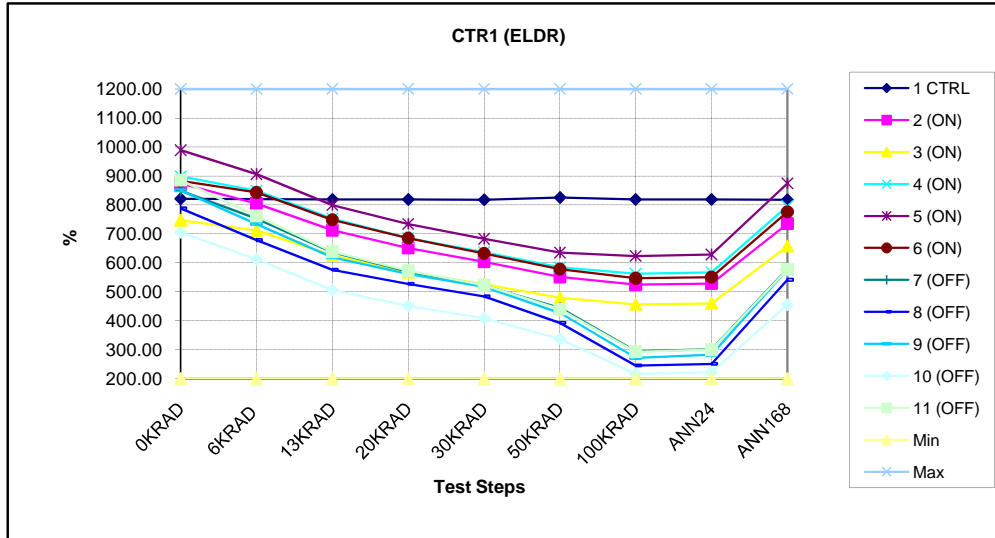
IR (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	100.E+06	100.E+06	100.E+06	100.E+06	100.E+06	100.E+06	100.E+06	100.E+06	100.E+06
Unit	pA	pA	pA	pA	pA	pA	pA	pA	pA
Control Results									
1 CTRL	41.1	43.5	41.4	44.0	40.1	39.5	42.2	41.3	38.8

Bias on results									
2 (ON)	20.2	31.1	24.0	17.6	21.3	23.4	20.9	19.5	19.2
3 (ON)	1.0	2.1	1.3	1.6	1.3	1.5	1.4	1.6	1.7
4 (ON)	4.8	10.7	6.4	5.0	6.7	7.1	8.3	11.4	16.4
5 (ON)	2.3	1.9	1.6	1.7	0.7	1.6	1.3	1.6	13.4
6 (ON)	20.4	22.2	21.6	21.6	22.4	28.2	30.7	37.5	48.5
Statistics bias on									
min result	1.0	1.9	1.3	1.6	0.7	1.5	1.3	1.6	1.7
max result	20.4	31.1	24.0	21.6	22.4	28.2	30.7	37.5	48.5
average	9.7	13.6	11.0	9.5	10.5	12.3	12.5	14.3	19.8
sigma	9.7	12.8	11.0	9.4	10.6	12.6	12.9	15.0	17.4

Bias off results									
7 (OFF)	2.1	2.1	2.2	8.0	1.4	1.7	3.2	2.5	2.4
8 (OFF)	3.6	3.3	3.8	5.1	3.3	13.4	4.1	2.6	3.7
9 (OFF)	0.4	0.3	0.3	0.6	0.3	0.6	0.3	0.6	0.6
10 (OFF)	1.7	2.2	1.9	1.9	1.7	3.5	2.0	2.3	1.6
11 (OFF)	2.4	3.2	2.5	3.4	2.9	2.9	2.7	3.3	2.8
Statistics bias off									
min result	0.4	0.3	0.3	0.6	0.3	0.6	0.3	0.6	0.6
max result	3.6	3.3	3.8	8.0	3.3	13.4	4.1	3.3	3.7
average	2.1	2.2	2.1	3.8	1.9	4.4	2.5	2.3	2.2
sigma	1.2	1.2	1.2	2.9	1.2	5.1	1.4	1.0	1.2



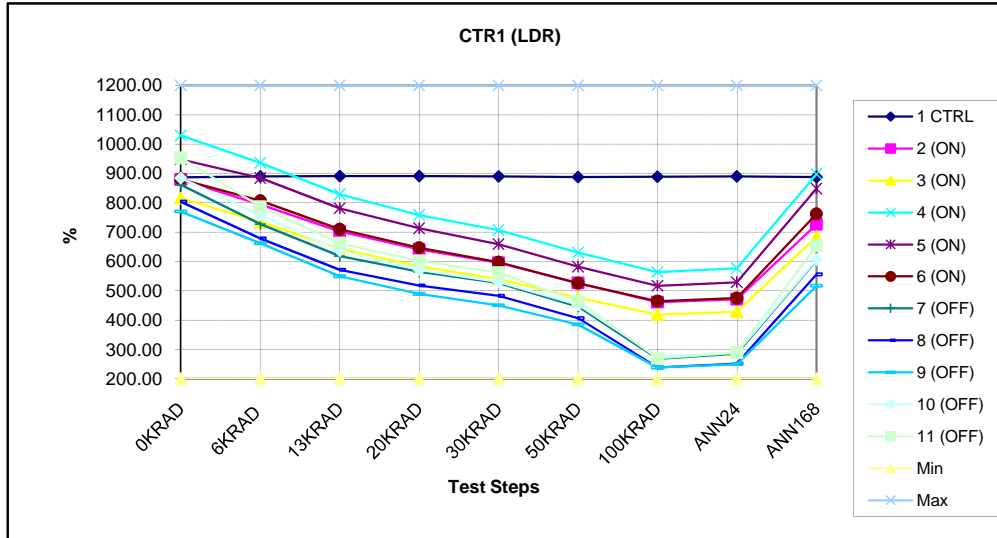
IR (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	22.2	45.9	23.3	18.0	17.3	22.9	18.7	13.9	57.1
ELDR OFF	0.3	0.3	0.3	0.5	0.9	0.4	0.5	0.5	0.8
LDR ON	9.7	13.6	11.0	9.5	10.5	12.3	12.5	14.3	19.8
LDR OFF	2.1	2.2	2.1	3.8	1.9	4.4	2.5	2.3	2.2



CTR1 (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	200	200	200	200	200	200	200	200	200
Max	1200	1200	1200	1200	1200	1200	1200	1200	1200
Unit	%	%	%	%	%	%	%	%	%
Control Results									
1 CTRL	820.5	819.6	819.0	818.3	818.0	825.1	818.2	818.1	817.8

Bias on results									
2 (ON)	874.0	804.2	712.4	651.1	603.3	550.9	524.4	528.2	734.6
3 (ON)	746.4	711.2	625.5	567.7	525.7	479.4	456.7	460.0	657.6
4 (ON)	898.4	848.8	752.0	684.4	635.8	584.0	562.3	566.4	795.4
5 (ON)	988.1	905.2	799.1	733.7	682.3	634.9	623.2	628.4	873.7
6 (ON)	882.3	842.4	748.3	685.1	632.1	577.9	546.5	550.6	775.5
Statistics bias on									
min result	746.4	711.2	625.5	567.7	525.7	479.4	456.7	460.0	657.6
max result	988.1	905.2	799.1	733.7	682.3	634.9	623.2	628.4	873.7
average	877.8	822.4	727.5	664.4	615.8	565.4	542.6	546.7	767.4
sigma	86.4	71.9	64.8	61.6	57.8	56.9	60.4	61.1	79.5

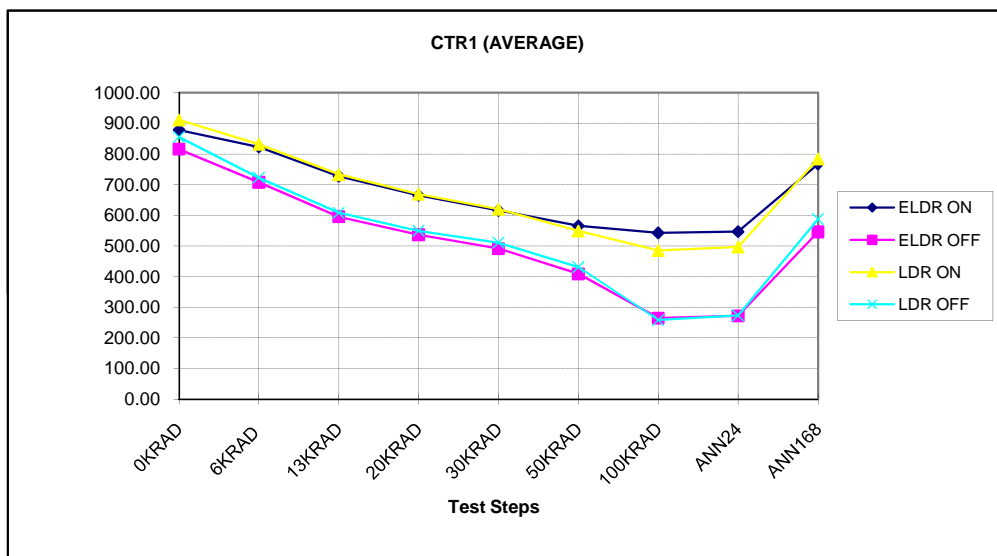
Bias off results									
7 (OFF)	847.9	752.2	635.9	569.3	521.2	443.8	295.1	302.0	578.4
8 (OFF)	788.0	677.9	575.9	527.3	484.1	392.9	245.8	251.6	541.3
9 (OFF)	849.6	733.7	618.6	561.6	517.7	426.8	271.7	282.9	576.4
10 (OFF)	704.9	611.6	506.5	450.6	409.3	337.5	216.9	222.6	455.7
11 (OFF)	885.1	761.3	638.3	571.8	522.5	440.3	293.4	300.5	576.3
Statistics bias off									
min result	704.9	611.6	506.5	450.6	409.3	337.5	216.9	222.6	455.7
max result	885.1	761.3	638.3	571.8	522.5	443.8	295.1	302.0	578.4
average	815.1	707.4	595.0	536.1	491.0	408.3	264.6	271.9	545.6
sigma	70.8	62.6	55.5	51.0	48.3	44.4	33.3	34.2	52.6



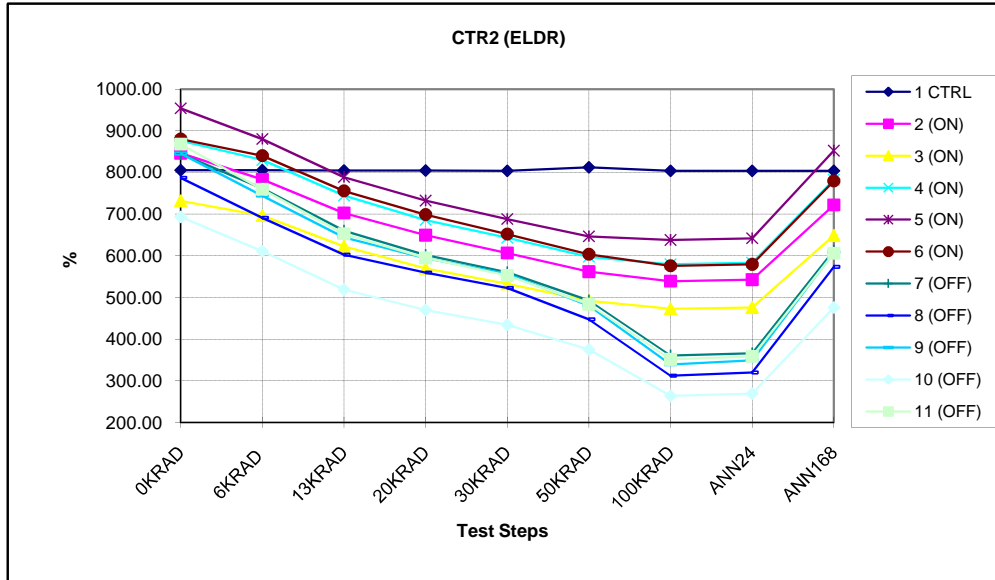
CTR1 (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	200	200	200	200	200	200	200	200	200
Max	1200	1200	1200	1200	1200	1200	1200	1200	1200
Unit	%	%	%	%	%	%	%	%	%
Control Results									
1 CTRL	886.3	889.9	891.6	891.3	890.5	888.3	888.7	889.7	887.4

Bias on results									
2 (ON)	879.6	794.3	702.2	641.1	595.3	526.8	461.6	471.1	726.4
3 (ON)	816.0	734.7	642.9	583.5	540.2	476.7	418.8	428.4	684.8
4 (ON)	1029.3	936.4	828.5	758.5	707.0	630.0	563.7	576.4	897.7
5 (ON)	948.3	884.5	780.9	712.8	658.9	581.8	516.7	528.9	848.2
6 (ON)	880.3	806.8	709.6	646.9	597.3	525.9	464.5	475.2	762.1
Statistics bias on									
min result	816.0	734.7	642.9	583.5	540.2	476.7	418.8	428.4	684.8
max result	1029.3	936.4	828.5	758.5	707.0	630.0	563.7	576.4	897.7
average	910.7	831.3	732.8	668.6	619.8	548.2	485.0	496.0	783.8
sigma	81.2	79.3	72.5	68.0	64.4	58.9	56.0	57.4	87.6

Bias off results									
7 (OFF)	861.2	727.3	618.6	564.5	526.5	445.3	268.1	285.7	603.9
8 (OFF)	804.4	678.6	571.5	517.9	482.5	406.1	238.1	251.2	555.8
9 (OFF)	770.1	662.0	549.4	489.4	450.7	384.9	238.0	249.5	517.3
10 (OFF)	884.6	758.1	637.2	571.6	530.0	452.2	276.1	289.5	606.2
11 (OFF)	953.3	786.1	661.8	601.9	561.4	464.6	270.2	289.2	653.7
Statistics bias off									
min result	770.1	662.0	549.4	489.4	450.7	384.9	238.0	249.5	517.3
max result	953.3	786.1	661.8	601.9	561.4	464.6	276.1	289.5	653.7
average	854.7	722.4	607.7	549.1	510.2	430.6	258.1	273.0	587.4
sigma	71.3	52.3	46.4	44.9	43.5	33.6	18.5	20.7	52.3



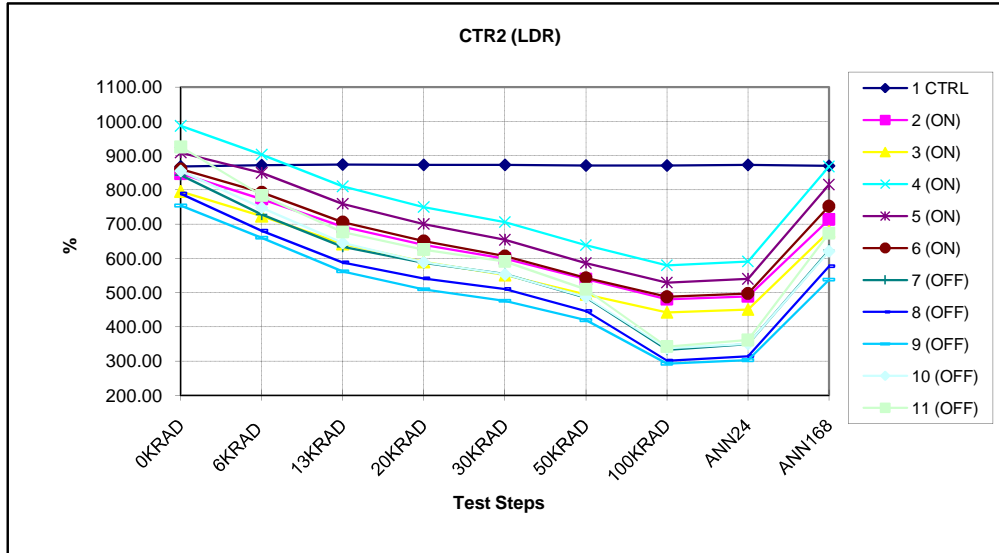
CTR1 (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	877.8	822.4	727.5	664.4	615.8	565.4	542.6	546.7	767.4
ELDR OFF	815.1	707.4	595.0	536.1	491.0	408.3	264.6	271.9	545.6
LDR ON	910.7	831.3	732.8	668.6	619.8	548.2	485.0	496.0	783.8
LDR OFF	854.7	722.4	607.7	549.1	510.2	430.6	258.1	273.0	587.4



CTR2 (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	--	--	--	--	--	--	--	--	--
Unit	%	%	%	%	%	%	%	%	%
Control Results									
1 CTRL	805.8	805.2	804.8	804.4	803.8	812.0	804.2	803.8	803.9

Bias on results									
2 (ON)	845.8	783.3	702.8	649.2	606.8	561.6	539.3	542.5	721.7
3 (ON)	731.6	696.6	622.3	570.0	532.5	491.8	473.0	475.7	648.4
4 (ON)	876.0	829.8	744.7	685.6	643.0	597.5	579.6	583.5	782.2
5 (ON)	954.1	880.1	788.6	732.2	688.0	646.8	637.6	641.9	852.0
6 (ON)	880.2	840.3	755.7	698.7	651.9	603.4	576.0	579.4	779.7
Statistics bias on									
min result	731.6	696.6	622.3	570.0	532.5	491.8	473.0	475.7	648.4
max result	954.1	880.1	788.6	732.2	688.0	646.8	637.6	641.9	852.0
average	857.5	806.0	722.8	667.1	624.5	580.2	561.1	564.6	756.8
sigma	80.9	70.2	64.0	61.9	58.9	57.9	60.6	61.1	76.2

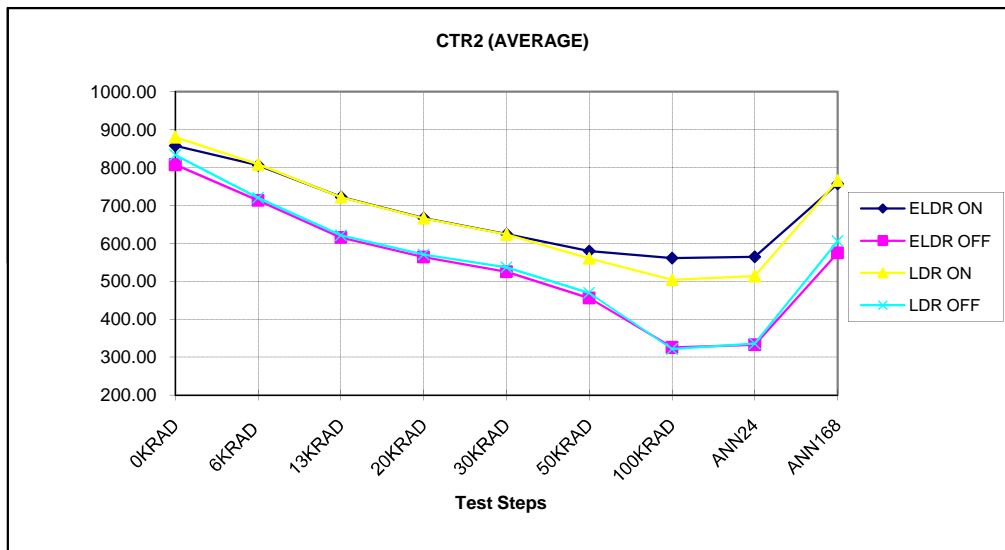
Bias off results									
7 (OFF)	844.4	761.5	660.3	601.7	560.5	493.1	360.9	366.1	612.4
8 (OFF)	787.3	691.3	602.3	559.7	522.9	447.2	312.2	319.7	573.1
9 (OFF)	845.1	744.3	644.3	594.1	556.5	480.5	339.3	349.4	608.3
10 (OFF)	693.6	610.9	518.8	469.9	434.1	374.9	263.8	269.4	476.1
11 (OFF)	867.9	759.7	652.7	594.6	552.5	483.4	351.2	358.6	605.9
Statistics bias off									
min result	693.6	610.9	518.8	469.9	434.1	374.9	263.8	269.4	476.1
max result	867.9	761.5	660.3	601.7	560.5	493.1	360.9	366.1	612.4
average	807.6	713.5	615.7	564.0	525.3	455.8	325.5	332.6	575.2
sigma	70.4	64.0	58.6	55.1	53.1	48.4	39.0	39.5	57.5



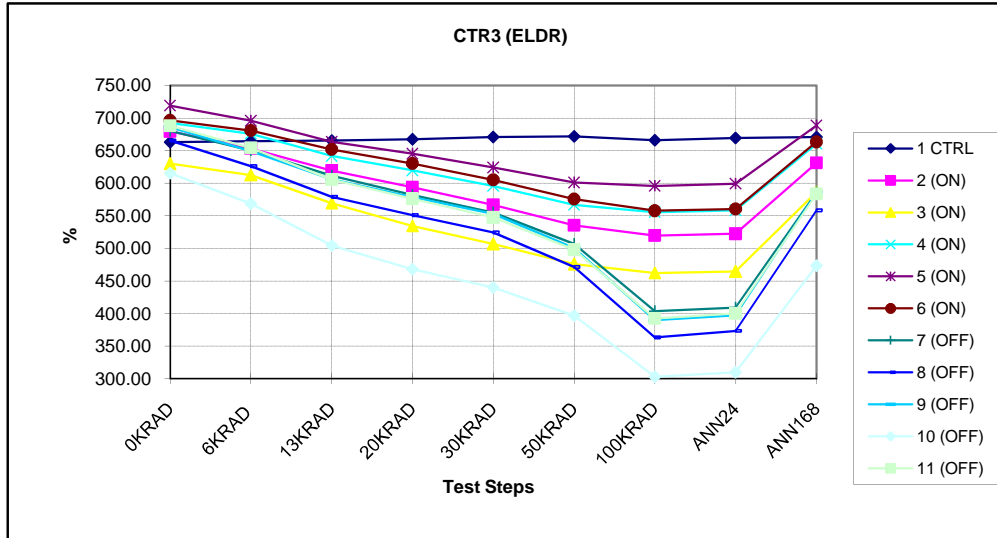
CTR2 (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	--	--	--	--	--	--	--	--	--
Unit	%	%	%	%	%	%	%	%	%
Control Results									
1 CTRL	868.7	872.3	873.9	873.4	873.4	871.3	871.6	872.6	870.3

Bias on results									
2 (ON)	847.8	773.2	692.5	639.5	599.5	539.0	480.7	489.1	713.5
3 (ON)	795.3	723.2	641.9	589.7	551.3	494.6	442.4	450.8	678.9
4 (ON)	987.0	903.4	810.3	750.2	705.7	638.7	579.8	591.1	868.1
5 (ON)	908.9	849.5	759.3	700.6	654.0	586.6	529.3	539.9	815.2
6 (ON)	861.2	792.9	706.1	650.9	606.8	543.0	487.6	497.4	752.2
Statistics bias on									
min result	795.3	723.2	641.9	589.7	551.3	494.6	442.4	450.8	678.9
max result	987.0	903.4	810.3	750.2	705.7	638.7	579.8	591.1	868.1
average	880.0	808.4	722.0	666.2	623.5	560.4	503.9	513.7	765.6
sigma	72.2	69.7	64.7	61.3	58.6	54.5	52.4	53.6	76.4

Bias off results									
7 (OFF)	843.6	728.0	634.0	586.9	554.0	484.9	333.1	350.1	623.2
8 (OFF)	789.2	680.5	588.1	541.7	510.9	446.0	301.1	314.2	577.1
9 (OFF)	754.2	659.9	562.1	509.9	476.3	419.6	292.4	302.6	537.5
10 (OFF)	855.0	747.9	645.0	588.9	553.3	487.3	337.5	350.4	621.1
11 (OFF)	925.2	783.4	676.9	625.6	590.8	509.5	342.4	361.6	673.0
Statistics bias off									
min result	754.2	659.9	562.1	509.9	476.3	419.6	292.4	302.6	537.5
max result	925.2	783.4	676.9	625.6	590.8	509.5	342.4	361.6	673.0
average	833.5	720.0	621.2	570.6	537.1	469.5	321.3	335.8	606.4
sigma	65.6	50.1	45.9	45.1	44.2	36.0	22.8	25.8	51.3



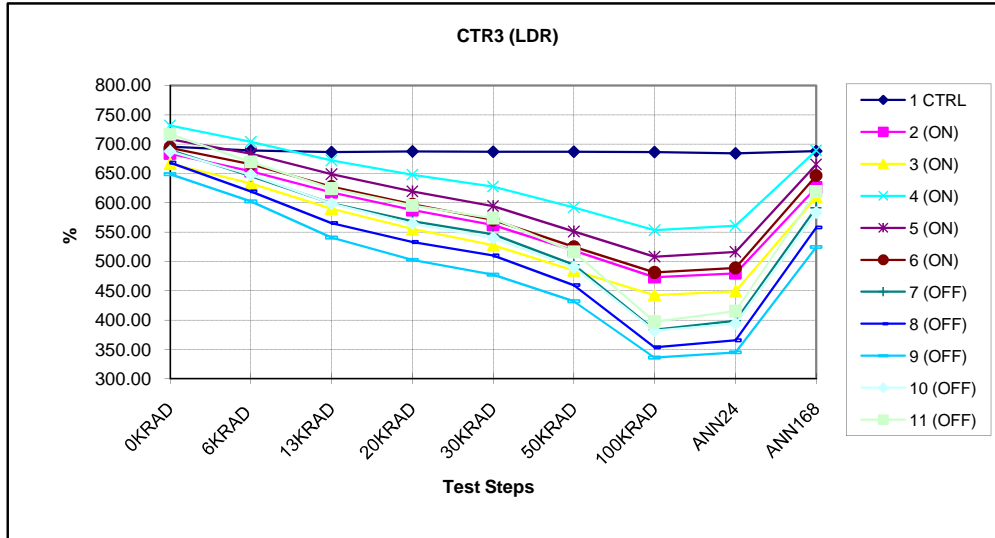
CTR2 (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	857.5	806.0	722.8	667.1	624.5	580.2	561.1	564.6	756.8
ELDR OFF	807.6	713.5	615.7	564.0	525.3	455.8	325.5	332.6	575.2
LDR ON	880.0	808.4	722.0	666.2	623.5	560.4	503.9	513.7	765.6
LDR OFF	833.5	720.0	621.2	570.6	537.1	469.5	321.3	335.8	606.4



CTR3 (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	--	--	--	--	--	--	--	--	--
Unit	%	%	%	%	%	%	%	%	%
Control Results									
1 CTRL	663.1	664.5	665.6	667.4	670.8	672.1	666.2	669.3	671.0

Bias on results									
2 (ON)	679.7	653.4	619.3	593.9	566.8	535.4	519.9	522.4	631.2
3 (ON)	630.0	612.5	569.3	534.5	506.8	475.9	462.4	464.5	586.6
4 (ON)	692.7	676.0	641.7	619.6	595.8	566.8	555.8	558.4	660.7
5 (ON)	719.3	695.8	663.8	645.2	624.1	601.0	595.8	599.4	688.7
6 (ON)	696.5	681.0	651.8	630.2	605.4	575.8	557.9	560.6	663.5
Statistics bias on									
min result	630.0	612.5	569.3	534.5	506.8	475.9	462.4	464.5	586.6
max result	719.3	695.8	663.8	645.2	624.1	601.0	595.8	599.4	688.7
average	683.6	663.8	629.2	604.7	579.8	551.0	538.4	541.1	646.2
sigma	33.2	32.4	37.2	43.5	45.8	48.1	50.2	50.7	39.0

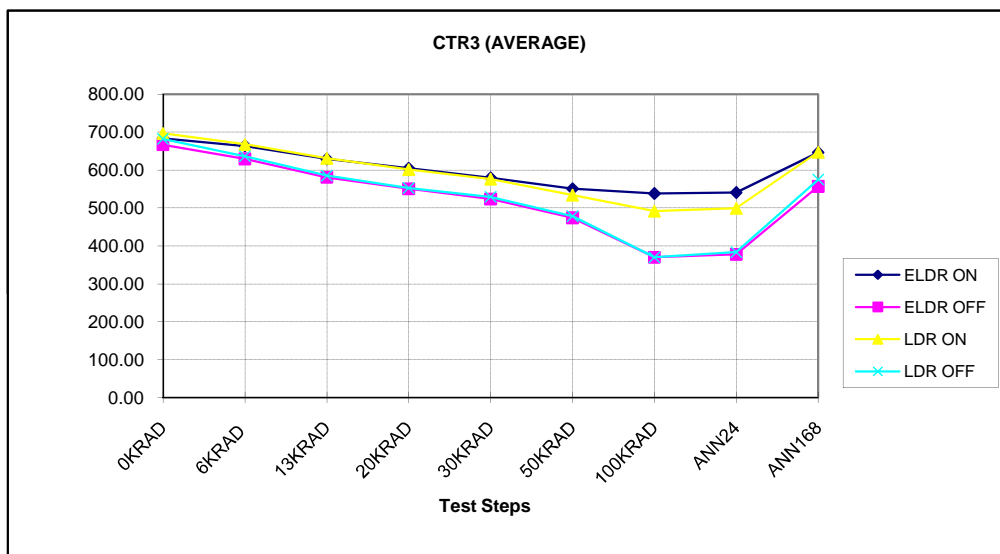
Bias off results									
7 (OFF)	680.1	650.1	611.6	582.1	555.0	507.0	403.9	409.0	585.9
8 (OFF)	665.8	626.1	579.0	551.1	524.5	471.5	363.4	373.3	558.4
9 (OFF)	686.3	649.3	605.9	578.6	552.9	500.3	389.8	397.5	586.2
10 (OFF)	615.4	568.6	504.6	467.9	440.3	396.8	303.3	309.9	473.3
11 (OFF)	688.3	654.3	605.7	576.3	547.4	498.1	392.6	400.3	583.6
Statistics bias off									
min result	615.4	568.6	504.6	467.9	440.3	396.8	303.3	309.9	473.3
max result	688.3	654.3	611.6	582.1	555.0	507.0	403.9	409.0	586.2
average	667.2	629.7	581.4	551.2	524.0	474.7	370.6	378.0	557.5
sigma	30.2	35.9	44.7	48.2	48.4	45.6	40.5	40.3	48.5



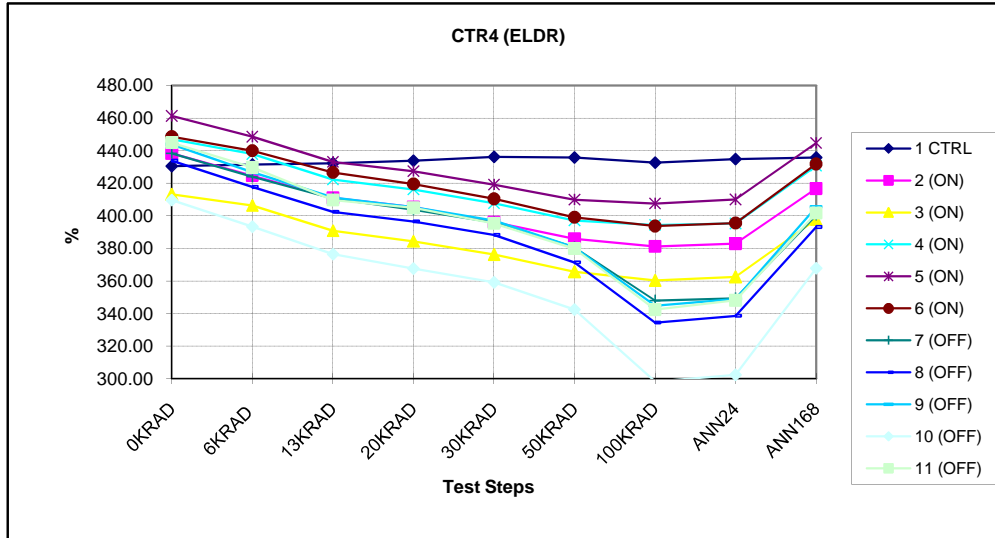
CTR3 (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	--	--	--	--	--	--	--	--	--
Unit	%	%	%	%	%	%	%	%	%
Control Results									
1 CTRL	695.7	689.5	686.4	687.5	687.2	687.1	686.4	684.5	688.3

Bias on results									
2 (ON)	683.7	653.8	618.0	587.6	562.2	518.6	473.4	479.8	625.8
3 (ON)	666.8	633.1	589.8	555.5	527.9	484.7	442.7	449.2	609.7
4 (ON)	731.7	703.8	672.1	647.8	627.7	592.1	553.3	560.8	689.4
5 (ON)	708.6	683.5	648.7	619.5	594.4	551.0	508.3	516.4	665.2
6 (ON)	693.5	665.6	627.7	597.4	570.6	524.8	481.1	488.7	646.3
Statistics bias on									
min result	666.8	633.1	589.8	555.5	527.9	484.7	442.7	449.2	609.7
max result	731.7	703.8	672.1	647.8	627.7	592.1	553.3	560.8	689.4
average	696.9	668.0	631.2	601.6	576.6	534.2	491.7	499.0	647.3
sigma	24.7	27.1	31.2	34.6	37.2	40.1	41.6	42.1	31.5

Bias off results									
7 (OFF)	690.0	645.4	599.0	568.9	546.5	494.3	383.8	399.2	591.6
8 (OFF)	668.3	619.6	565.6	533.0	510.1	459.7	353.4	365.6	557.8
9 (OFF)	648.6	602.4	540.7	502.6	477.2	432.1	335.9	345.1	524.5
10 (OFF)	687.5	647.8	598.8	564.5	540.4	490.3	382.1	394.1	583.6
11 (OFF)	717.0	669.7	624.2	595.4	573.6	516.3	397.1	415.0	618.8
Statistics bias off									
min result	648.6	602.4	540.7	502.6	477.2	432.1	335.9	345.1	524.5
max result	717.0	669.7	624.2	595.4	573.6	516.3	397.1	415.0	618.8
average	682.3	637.0	585.6	552.9	529.6	478.5	370.5	383.8	575.3
sigma	25.6	26.3	32.6	35.8	37.0	32.9	25.0	28.0	35.8



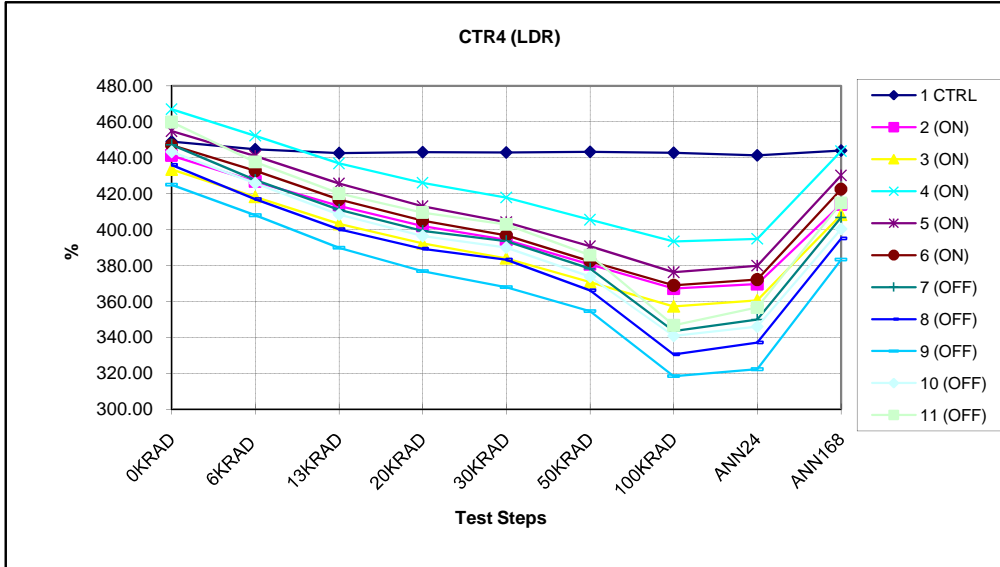
CTR3 (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	683.6	663.8	629.2	604.7	579.8	551.0	538.4	541.1	646.2
ELDR OFF	667.2	629.7	581.4	551.2	524.0	474.7	370.6	378.0	557.5
LDR ON	696.9	668.0	631.2	601.6	576.6	534.2	491.7	499.0	647.3
LDR OFF	682.3	637.0	585.6	552.9	529.6	478.5	370.5	383.8	575.3



CTR4 (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	--	--	--	--	--	--	--	--	--
Unit	%	%	%	%	%	%	%	%	%
Control Results									
1 CTRL	430.5	431.4	432.2	433.9	436.2	435.9	432.6	434.8	435.9

Bias on results									
2 (ON)	438.3	424.6	411.0	405.3	396.1	385.9	381.2	382.9	416.7
3 (ON)	413.1	406.4	390.8	384.3	376.2	365.6	360.3	362.5	397.7
4 (ON)	447.1	437.9	422.2	416.2	407.8	397.1	394.4	395.3	430.8
5 (ON)	461.3	448.5	433.1	427.4	419.2	409.9	407.5	410.0	444.7
6 (ON)	448.6	439.9	426.6	419.6	410.4	399.2	393.7	395.6	431.8
Statistics bias on									
min result	413.1	406.4	390.8	384.3	376.2	365.6	360.3	362.5	397.7
max result	461.3	448.5	433.1	427.4	419.2	409.9	407.5	410.0	444.7
average	441.7	431.5	416.8	410.6	401.9	391.5	387.4	389.2	424.3
sigma	17.9	16.4	16.6	16.7	16.6	16.8	17.8	17.8	17.9

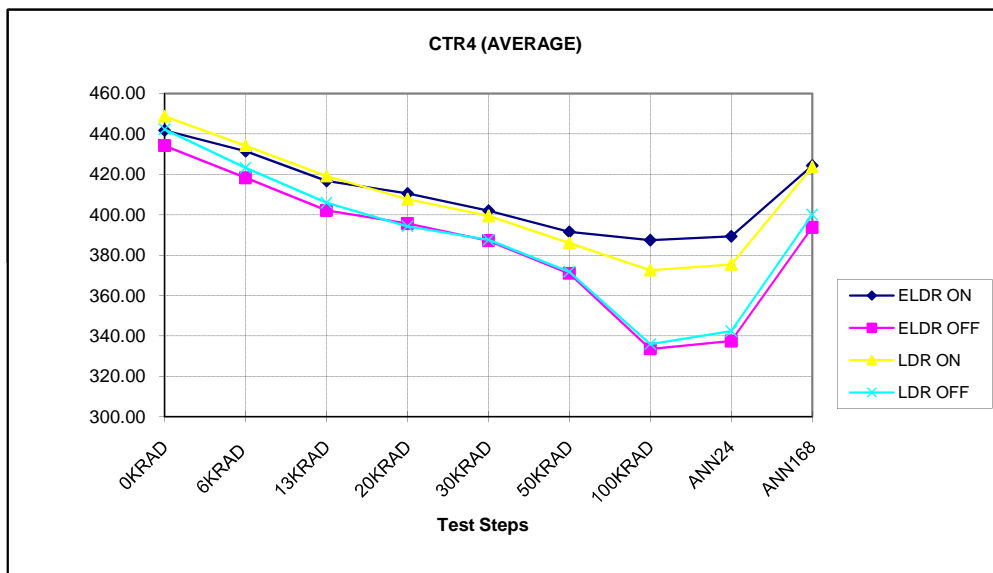
Bias off results									
7 (OFF)	438.4	424.0	410.6	403.7	396.0	380.6	347.9	349.4	400.5
8 (OFF)	433.9	417.6	402.4	396.6	388.3	371.4	334.4	338.6	393.1
9 (OFF)	443.8	426.7	411.3	405.3	397.1	380.6	344.9	348.9	405.4
10 (OFF)	409.6	393.4	376.5	367.5	359.1	342.5	298.3	302.4	367.8
11 (OFF)	444.9	429.7	409.7	404.9	395.3	379.9	342.4	348.1	401.7
Statistics bias off									
min result	409.6	393.4	376.5	367.5	359.1	342.5	298.3	302.4	367.8
max result	444.9	429.7	411.3	405.3	397.1	380.6	347.9	349.4	405.4
average	434.1	418.3	402.1	395.6	387.2	371.0	333.6	337.5	393.7
sigma	14.4	14.6	14.8	16.1	16.0	16.4	20.3	20.1	15.1



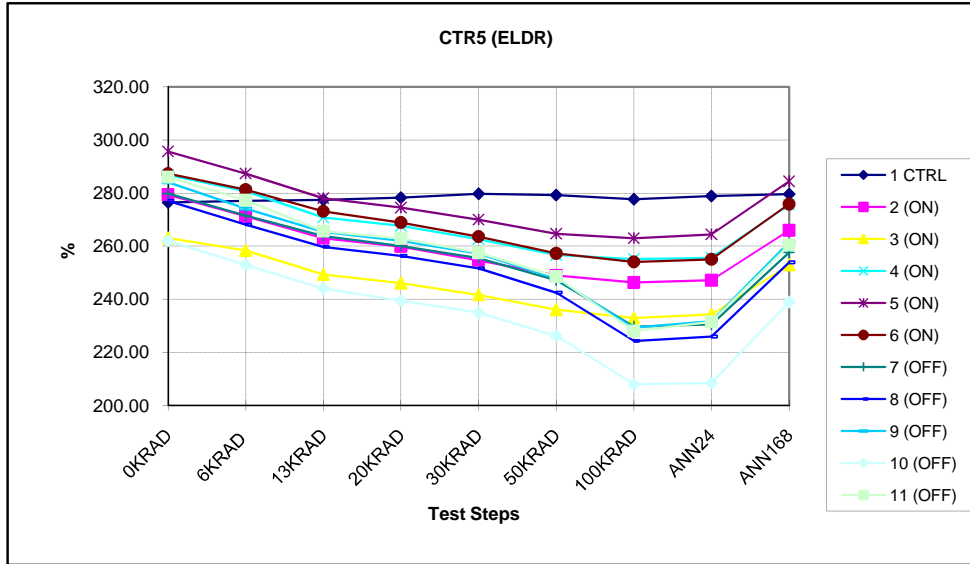
CTR4 (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	--	--	--	--	--	--	--	--	--
Unit	%	%	%	%	%	%	%	%	%
Control Results									
1 CTRL	448.9	444.6	442.6	443.2	442.9	443.3	442.7	441.3	444.0

Bias on results									
2 (ON)	441.2	426.8	413.2	402.0	394.2	380.7	367.2	369.7	414.0
3 (ON)	433.4	418.2	403.1	392.3	384.0	370.7	357.2	360.6	408.2
4 (ON)	467.1	452.2	436.8	426.1	417.9	405.5	393.5	394.8	443.7
5 (ON)	454.8	441.0	425.6	412.9	404.2	390.7	376.2	379.9	430.1
6 (ON)	447.0	432.7	416.7	404.9	396.8	382.4	368.9	372.1	422.5
Statistics bias on									
min result	433.4	418.2	403.1	392.3	384.0	370.7	357.2	360.6	408.2
max result	467.1	452.2	436.8	426.1	417.9	405.5	393.5	394.8	443.7
average	448.7	434.2	419.1	407.6	399.4	386.0	372.6	375.4	423.7
sigma	12.9	13.1	12.8	12.7	12.6	13.0	13.5	12.8	13.9

Bias off results									
7 (OFF)	447.3	427.6	411.0	399.3	393.6	378.3	343.5	350.0	406.8
8 (OFF)	436.0	417.0	400.1	389.3	383.2	366.2	330.6	337.2	395.1
9 (OFF)	424.9	408.0	389.8	376.9	368.0	354.7	318.5	322.2	383.3
10 (OFF)	443.2	425.8	408.4	396.4	390.1	373.8	340.9	346.1	400.3
11 (OFF)	459.8	437.7	420.1	409.5	402.9	385.7	346.7	356.6	414.9
Statistics bias off									
min result	424.9	408.0	389.8	376.9	368.0	354.7	318.5	322.2	383.3
max result	459.8	437.7	420.1	409.5	402.9	385.7	346.7	356.6	414.9
average	442.2	423.2	405.9	394.3	387.6	371.7	336.0	342.4	400.1
sigma	13.0	11.2	11.5	12.1	13.0	11.9	11.5	13.3	11.9



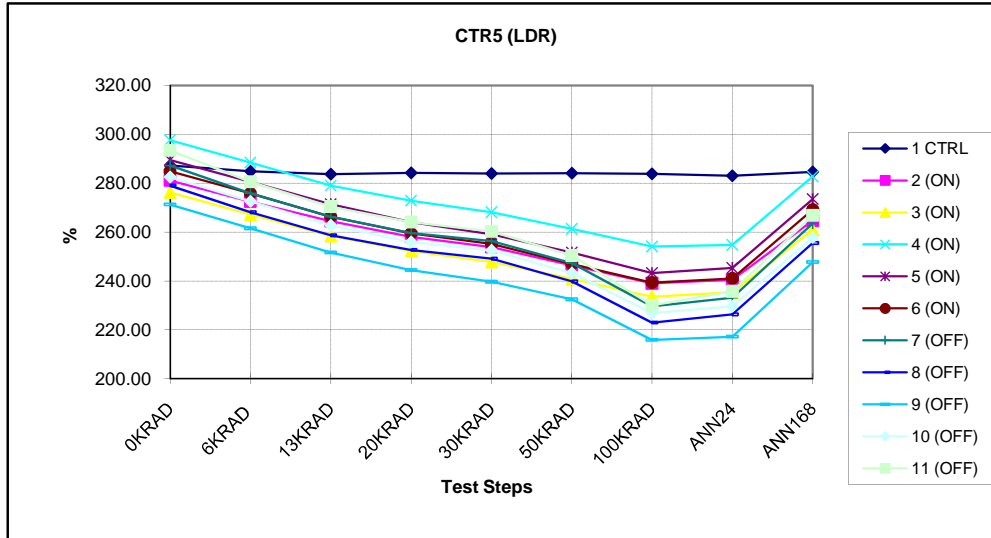
CTR4 (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	441.7	431.5	416.8	410.6	401.9	391.5	387.4	389.2	424.3
ELDR OFF	434.1	418.3	402.1	395.6	387.2	371.0	333.6	337.5	393.7
LDR ON	448.7	434.2	419.1	407.6	399.4	386.0	372.6	375.4	423.7
LDR OFF	442.2	423.2	405.9	394.3	387.6	371.7	336.0	342.4	400.1



CTR5 (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	--	--	--	--	--	--	--	--	--
Unit	%	%	%	%	%	%	%	%	%
Control Results									
1 CTRL	276.4	277.1	277.5	278.3	279.7	279.2	277.6	278.9	279.6

Bias on results									
2 (ON)	279.4	271.3	263.0	259.9	254.7	249.0	246.3	247.2	266.0
3 (ON)	263.0	258.3	249.3	246.0	241.7	236.1	233.0	234.3	252.9
4 (ON)	286.8	280.7	270.8	267.6	262.6	256.7	255.2	255.6	275.6
5 (ON)	295.7	287.3	278.1	274.5	270.0	264.7	263.0	264.5	284.4
6 (ON)	287.3	281.2	273.1	268.9	263.6	257.3	254.1	255.0	275.8
Statistics bias on									
min result	263.0	258.3	249.3	246.0	241.7	236.1	233.0	234.3	252.9
max result	295.7	287.3	278.1	274.5	270.0	264.7	263.0	264.5	284.4
average	282.5	275.8	266.9	263.4	258.5	252.7	250.3	251.3	271.0
sigma	12.3	11.3	11.2	11.0	10.9	10.8	11.3	11.3	12.0

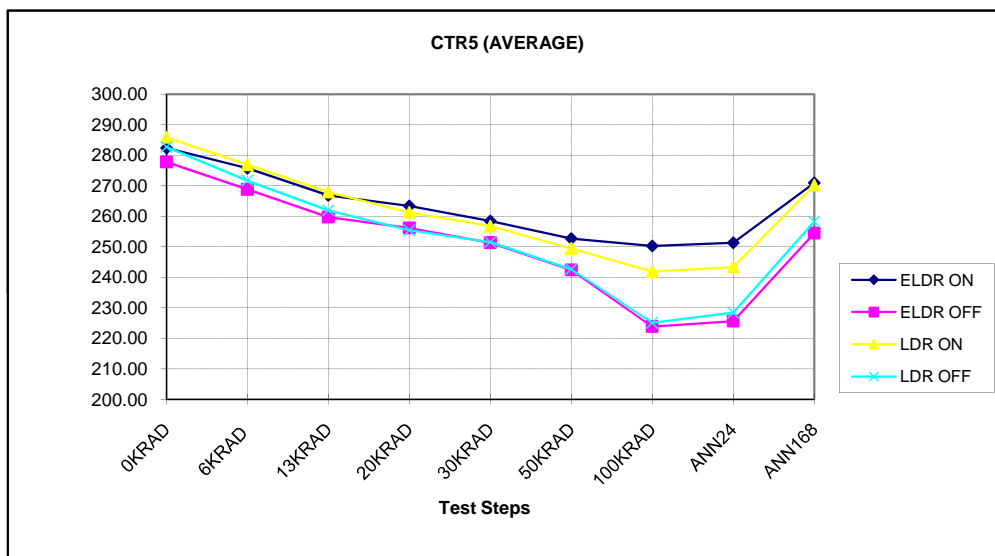
Bias off results									
7 (OFF)	279.8	271.5	263.9	260.1	255.5	247.2	229.7	230.5	257.7
8 (OFF)	277.1	268.1	259.8	256.3	251.6	242.5	224.3	225.9	253.9
9 (OFF)	284.0	274.2	265.4	262.0	257.2	247.9	229.3	231.7	261.6
10 (OFF)	262.0	253.0	244.0	239.5	235.1	226.2	207.9	208.5	239.0
11 (OFF)	286.0	277.3	265.6	262.9	257.5	248.6	228.0	231.6	260.5
Statistics bias off									
min result	262.0	253.0	244.0	239.5	235.1	226.2	207.9	208.5	239.0
max result	286.0	277.3	265.6	262.9	257.5	248.6	229.7	231.7	261.6
average	277.8	268.8	259.7	256.2	251.4	242.5	223.8	225.6	254.5
sigma	9.5	9.5	9.1	9.7	9.4	9.4	9.1	9.9	9.2



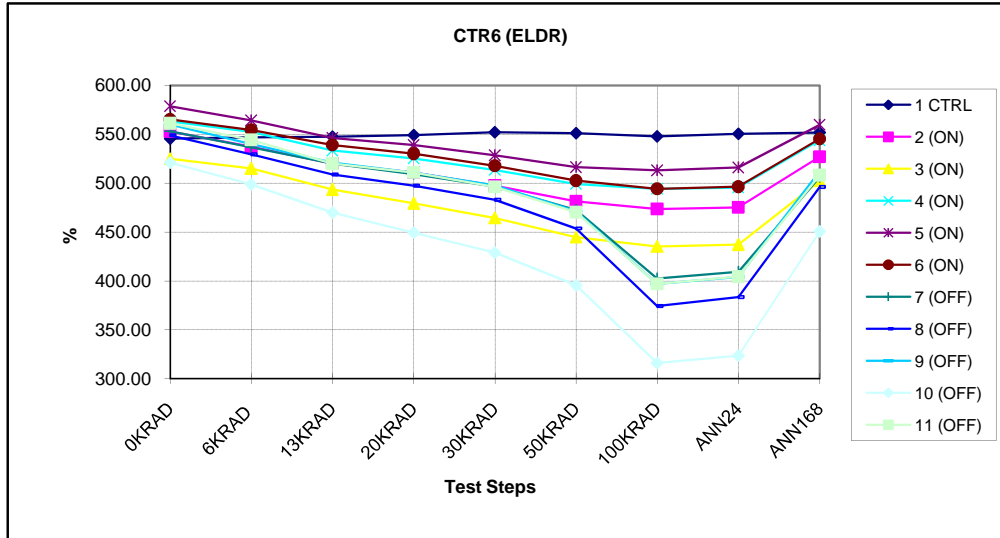
CTR5 (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	--	--	--	--	--	--	--	--	--
Unit	%	%	%	%	%	%	%	%	%
Control Results									
1 CTRL	287.3	284.9	283.8	284.2	284.0	284.1	283.9	283.1	284.6

Bias on results									
2 (ON)	281.2	272.5	264.5	258.1	253.9	246.4	239.0	240.4	264.7
3 (ON)	276.2	267.2	258.4	252.3	247.8	240.9	233.5	235.3	261.0
4 (ON)	297.6	288.4	279.1	272.9	268.1	261.3	254.1	254.7	282.8
5 (ON)	289.5	280.6	271.4	264.1	259.1	251.7	243.3	245.3	273.5
6 (ON)	284.9	275.8	266.3	259.5	255.2	246.9	239.4	241.0	269.2
Statistics bias on									
min result	276.2	267.2	258.4	252.3	247.8	240.9	233.5	235.3	261.0
max result	297.6	288.4	279.1	272.9	268.1	261.3	254.1	254.7	282.8
average	285.9	276.9	267.9	261.4	256.8	249.4	241.9	243.4	270.2
sigma	8.2	8.1	7.8	7.7	7.5	7.6	7.7	7.3	8.4

Bias off results									
7 (OFF)	287.277	275.846	266.31	259.664	256.29	247.276	229.655	233.171	263.54
8 (OFF)	279.057	268.088	258.658	252.705	249.121	239.792	222.949	226.338	255.551
9 (OFF)	271.279	261.529	251.637	244.485	239.682	232.497	215.906	217.194	247.71
10 (OFF)	282.61	272.65	262.8	255.985	252.527	243.303	226.901	229.66	257.759
11 (OFF)	293.458	280.597	270.431	264.12	260.347	250.429	230.055	235.757	266.862
Statistics bias off									
min result	271.3	261.5	251.6	244.5	239.7	232.5	215.9	217.2	247.7
max result	293.5	280.6	270.4	264.1	260.3	250.4	230.1	235.8	266.9
average	282.7	271.7	262.0	255.4	251.6	242.7	225.1	228.4	258.3
sigma	8.4	7.3	7.2	7.4	7.9	7.0	5.9	7.2	7.4



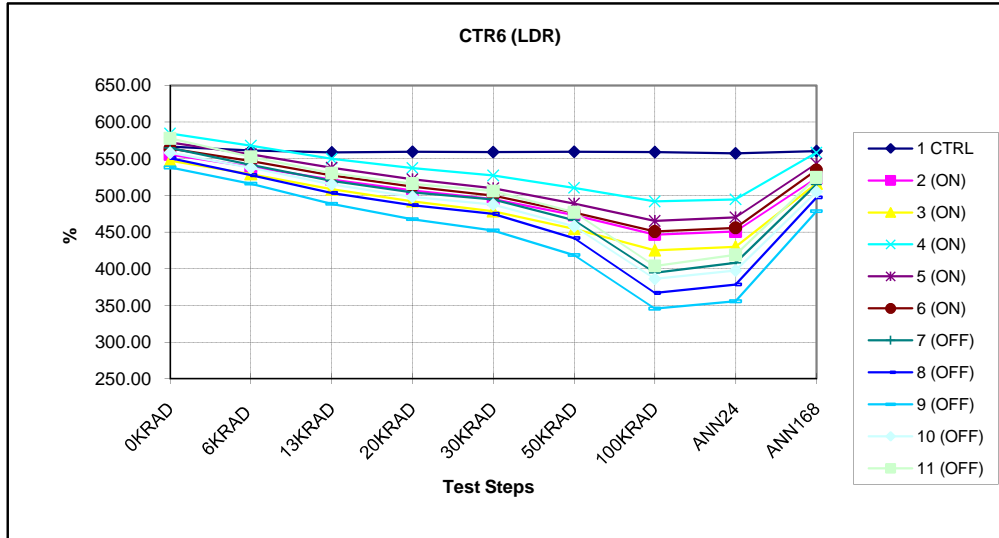
CTR5 (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	282.5	275.8	266.9	263.4	258.5	252.7	250.3	251.3	271.0
ELDR OFF	277.8	268.8	259.7	256.2	251.4	242.5	223.8	225.6	254.5
LDR ON	285.9	276.9	267.9	261.4	256.8	249.4	241.9	243.4	270.2
LDR OFF	282.7	271.7	262.0	255.4	251.6	242.7	225.1	228.4	258.3



CTR6 (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	--	--	--	--	--	--	--	--	--
Unit	%	%	%	%	%	%	%	%	%
Control Results									
1 CTRL	545.6	546.9	547.8	549.4	552.3	551.3	548.0	550.7	551.9

Bias on results									
2 (ON)	552.9	537.4	520.1	511.0	497.5	481.5	473.6	475.3	527.1
3 (ON)	525.0	515.1	493.5	479.4	464.6	444.9	435.3	437.2	502.5
4 (ON)	563.3	552.5	533.4	525.4	513.7	499.2	494.4	495.7	544.0
5 (ON)	578.8	564.2	546.4	539.0	528.6	516.4	513.2	516.1	559.8
6 (ON)	565.2	554.6	539.1	530.1	517.9	502.7	494.4	496.4	545.4
Statistics bias on									
min result	525.0	515.1	493.5	479.4	464.6	444.9	435.3	437.2	502.5
max result	578.8	564.2	546.4	539.0	528.6	516.4	513.2	516.1	559.8
average	557.0	544.8	526.5	517.0	504.4	488.9	482.2	484.1	535.8
sigma	20.1	19.2	20.8	23.3	24.9	27.6	29.7	30.0	21.9

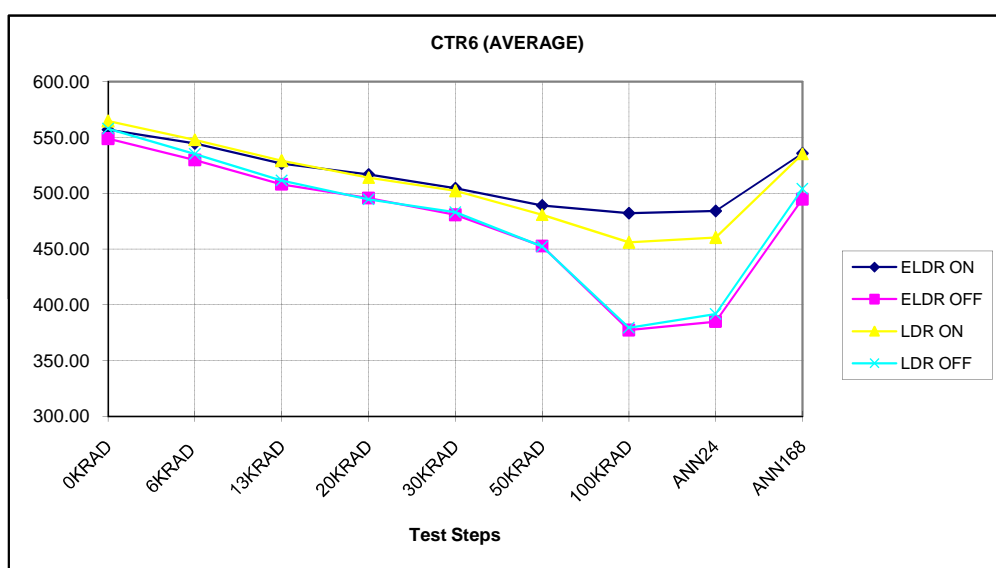
Bias off results									
7 (OFF)	553.3	536.8	520.1	509.4	496.5	472.5	402.5	409.5	506.3
8 (OFF)	549.0	529.5	509.0	497.5	483.1	453.7	374.3	383.5	496.1
9 (OFF)	560.2	540.2	521.1	511.1	497.9	471.3	397.0	404.2	512.2
10 (OFF)	521.0	498.8	469.9	449.4	429.1	395.6	316.0	323.7	450.6
11 (OFF)	561.3	544.4	520.1	511.1	496.4	470.4	397.0	404.4	508.2
Statistics bias off									
min result	521.0	498.8	469.9	449.4	429.1	395.6	316.0	323.7	450.6
max result	561.3	544.4	521.1	511.1	497.9	472.5	402.5	409.5	512.2
average	549.0	529.9	508.0	495.7	480.6	452.7	377.4	385.1	494.7
sigma	16.4	18.3	21.9	26.5	29.4	32.8	36.0	35.7	25.4



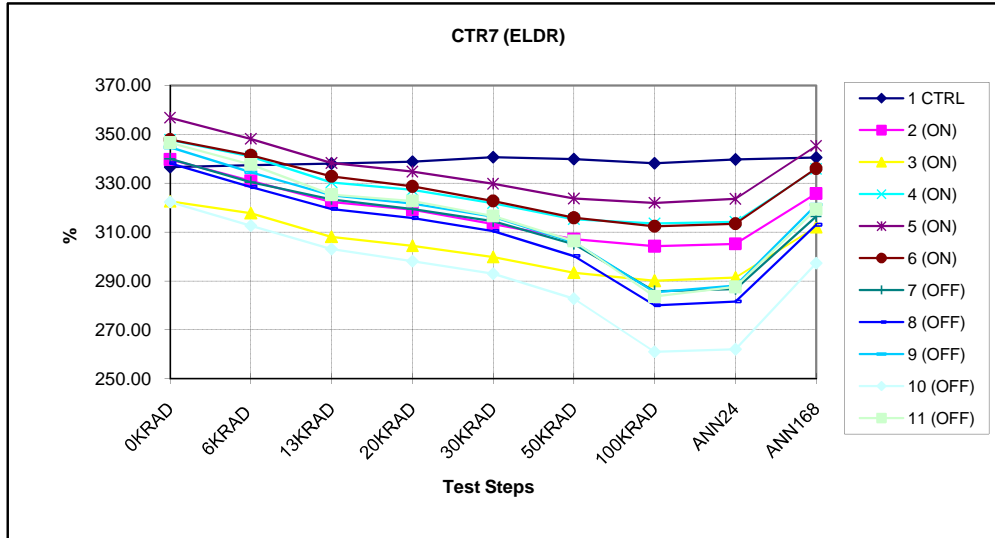
CTR6 (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	--	--	--	--	--	--	--	--	--
Unit	%	%	%	%	%	%	%	%	%
Control Results									
1 CTRL	566.5	561.2	558.7	559.7	559.2	559.7	559.0	557.3	560.4

Bias on results									
2 (ON)	555.8	539.1	521.7	506.7	495.2	473.2	446.7	450.9	523.7
3 (ON)	547.3	529.1	508.5	492.2	478.6	454.6	425.2	430.0	516.4
4 (ON)	584.4	567.9	550.2	537.5	527.2	510.5	491.9	494.6	558.2
5 (ON)	572.4	556.2	537.8	522.0	509.7	489.1	465.1	470.2	543.3
6 (ON)	563.9	547.0	527.4	512.0	499.9	476.8	450.9	455.9	534.6
Statistics bias on									
min result	547.3	529.1	508.5	492.2	478.6	454.6	425.2	430.0	516.4
max result	584.4	567.9	550.2	537.5	527.2	510.5	491.9	494.6	558.2
average	564.8	547.9	529.1	514.1	502.1	480.8	456.0	460.3	535.2
sigma	14.4	15.0	15.9	16.9	18.0	20.7	24.7	24.0	16.5

Bias off results									
7 (OFF)	564.742	541.613	520.056	504.387	494.438	466.159	394.467	408.314	515.008
8 (OFF)	550.993	527.57	503.322	486.77	474.761	441.857	367.007	378.546	497.264
9 (OFF)	538.085	516.176	488.606	467.723	452.225	418.774	345.669	355.598	478.638
10 (OFF)	558.435	537.955	515.178	498.248	487.417	457.96	386.184	397.551	504.917
11 (OFF)	577.776	552.629	530.609	516.076	505.959	476.922	403.969	418.994	524.594
Statistics bias off									
min result	538.1	516.2	488.6	467.7	452.2	418.8	345.7	355.6	478.6
max result	577.8	552.6	530.6	516.1	506.0	476.9	404.0	419.0	524.6
average	558.0	535.2	511.6	494.6	483.0	452.3	379.5	391.8	504.1
sigma	14.9	13.9	16.1	18.4	20.6	22.7	23.3	25.2	17.6



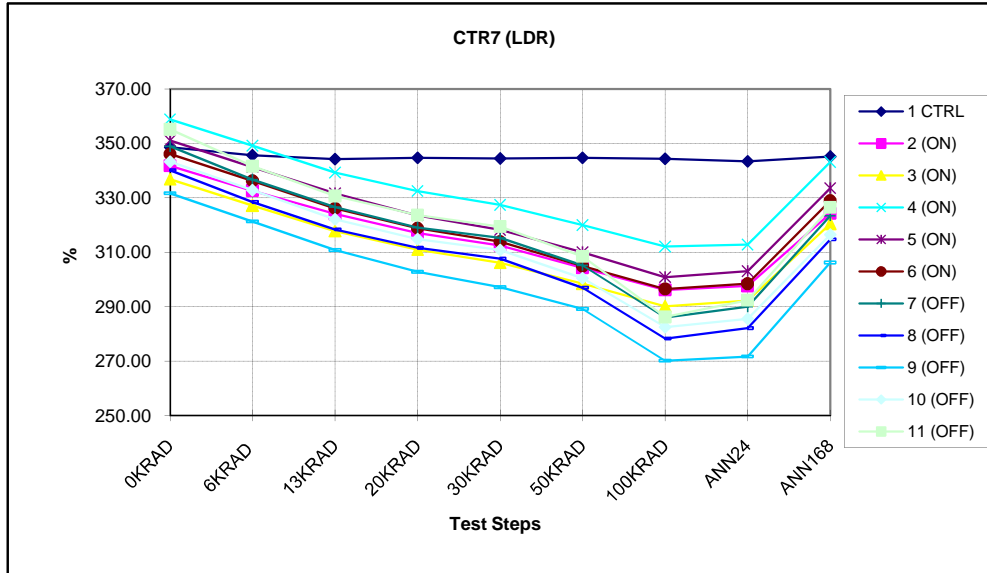
CTR6 (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	557.0	544.8	526.5	517.0	504.4	488.9	482.2	484.1	535.8
ELDR OFF	549.0	529.9	508.0	495.7	480.6	452.7	377.4	385.1	494.7
LDR ON	564.8	547.9	529.1	514.1	502.1	480.8	456.0	460.3	535.2
LDR OFF	558.0	535.2	511.6	494.6	483.0	452.3	379.5	391.8	504.1



CTR7 (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	--	--	--	--	--	--	--	--	--
Unit	%	%	%	%	%	%	%	%	%
Control Results									
1 CTRL	336.6	337.4	338.0	338.9	340.7	339.9	338.2	339.7	340.5

Bias on results									
2 (ON)	339.7	331.0	322.3	319.1	313.3	307.1	304.2	305.2	325.7
3 (ON)	322.6	317.8	308.1	304.4	299.8	293.4	290.1	291.4	312.1
4 (ON)	347.7	340.9	330.4	327.3	321.9	315.3	313.6	314.2	335.8
5 (ON)	356.8	348.1	338.3	334.7	329.7	323.8	322.0	323.6	345.3
6 (ON)	347.9	341.4	332.9	328.7	322.7	315.9	312.4	313.5	336.1
Statistics bias on									
min result	322.6	317.8	308.1	304.4	299.8	293.4	290.1	291.4	312.1
max result	356.8	348.147	338.297	334.744	329.735	323.755	321.961	323.624	345.264
average	343.0	335.8	326.4	322.9	317.5	311.1	308.4	309.6	331.0
sigma	12.9	11.8	11.7	11.7	11.5	11.5	12.0	12.1	12.6

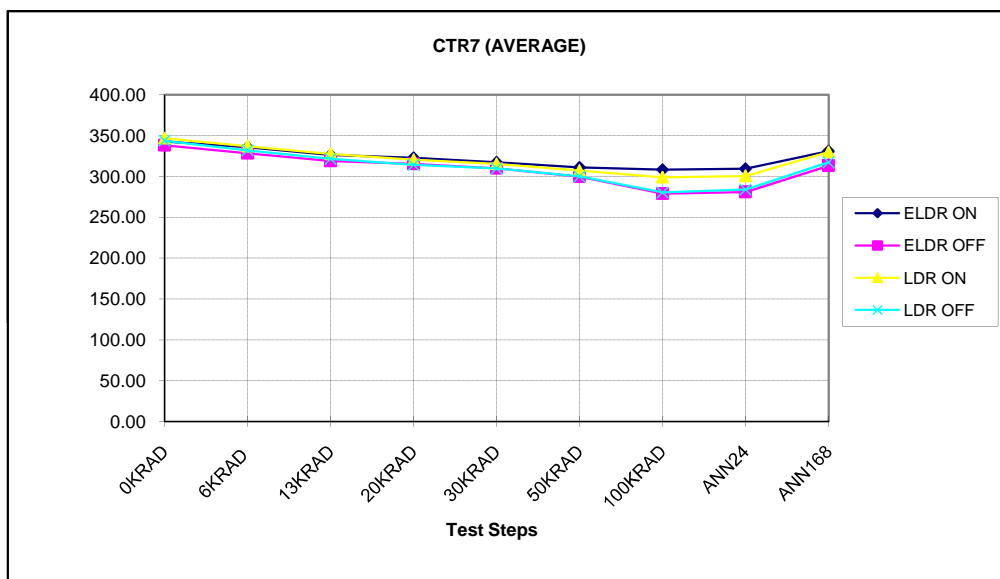
Bias off results									
7 (OFF)	340.1	330.5	323.4	319.5	314.4	305.0	285.7	286.7	316.4
8 (OFF)	338.2	328.4	319.5	315.8	310.4	300.2	280.0	281.7	313.0
9 (OFF)	344.7	334.5	325.1	321.7	316.3	305.8	285.4	288.2	321.2
10 (OFF)	322.3	312.6	303.1	298.2	293.0	282.8	261.0	262.0	297.4
11 (OFF)	346.6	337.7	325.3	322.7	316.6	306.4	283.7	287.6	319.3
Statistics bias off									
min result	322.3	312.6	303.1	298.2	293.0	282.8	261.0	262.0	297.4
max result	346.6	337.7	325.3	322.7	316.6	306.4	285.7	288.2	321.2
average	338.4	328.8	319.3	315.6	310.2	300.0	279.2	281.2	313.4
sigma	9.6	9.7	9.3	10.1	9.9	10.0	10.4	11.0	9.5



CTR7 (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	--	--	--	--	--	--	--	--	--
Unit	%	%	%	%	%	%	%	%	%
Control Results									
1 CTRL	348.5	345.6	344.2	344.7	344.4	344.7	344.4	343.4	345.1

Bias on results									
2 (ON)	341.8	332.6	324.1	317.1	312.5	304.2	296.2	297.6	324.3
3 (ON)	336.8	327.1	317.8	311.0	306.1	298.4	290.1	292.3	320.4
4 (ON)	358.8	349.1	339.2	332.5	327.3	320.0	312.1	312.8	343.1
5 (ON)	351.0	341.3	331.6	323.5	318.2	310.0	300.9	303.0	333.5
6 (ON)	346.1	336.2	326.1	318.8	313.9	304.9	296.5	298.5	329.0
Statistics bias on									
min result	336.8	327.1	317.8	311.0	306.1	298.4	290.1	292.3	320.4
max result	358.8	349.1	339.2	332.5	327.3	320.0	312.1	312.8	343.1
average	346.9	337.3	327.8	320.6	315.6	307.5	299.2	300.8	330.1
sigma	8.5	8.4	8.1	8.0	7.8	8.1	8.2	7.7	8.8

Bias off results									
7 (OFF)	348.8	336.7	326.5	319.0	315.3	305.2	286.0	290.0	323.4
8 (OFF)	340.1	328.4	318.3	311.6	307.6	297.0	278.3	282.1	314.7
9 (OFF)	331.7	321.3	310.8	302.8	297.2	289.2	270.2	271.7	306.2
10 (OFF)	343.3	332.8	322.2	314.8	310.8	300.5	282.5	285.5	316.4
11 (OFF)	355.1	341.6	330.6	323.7	319.4	308.5	286.2	292.4	326.4
Statistics bias off									
min result	331.7	321.3	310.8	302.8	297.2	289.2	270.2	271.7	306.2
max result	355.1	341.6	330.6	323.7	319.4	308.5	286.2	292.4	326.4
average	343.8	332.2	321.7	314.4	310.1	300.1	280.6	284.3	317.4
sigma	8.9	7.8	7.6	7.9	8.5	7.5	6.7	8.1	7.9



CTR7 (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	343.0	335.8	326.4	322.9	317.5	311.1	308.4	309.6	331.0
ELDR OFF	338.4	328.8	319.3	315.6	310.2	300.0	279.2	281.2	313.4
LDR ON	346.9	337.3	327.8	320.6	315.6	307.5	299.2	300.8	330.1
LDR OFF	343.8	332.2	321.7	314.4	310.1	300.1	280.6	284.3	317.4

ANNEX II DOSIMETRY



RADIATION TEST SUMMARY

 Irradiation Test Report Number : **20139**

 Date : **18 June 2012**

<i>Test Requester :</i>	<i>Name</i>	Alter Technology
	<i>Address</i>	Avd. Tomas Alba Edison, 4 41092 Seville (SPAIN)
	<i>Personnel present :</i>	E Munoz Plaza, J Jimenez Carreira, E Bernabeu Torres
	<i>Project/Cost Code :</i>	TRP
	<i>Devices/Components irradiated :</i>	Linear Devices AD565AT,OP470,AD584,PM139X,REF02,OP27,UC1843
	<i>Device/Component details :</i>	AD565AT,OP470,OP27,AD565AT,OLH249,OLH449 66183-105,AD565AT,PM139X,PM139X,SOC5551,UC1846

(conditions and identification)

<i>Dosimetry Chain used :</i>	B
<i>Dosimeter :</i>	Farmer model 2680 – s/n 109
<i>Gas Ionisation Chamber :</i>	NE Type 2571 – s/n 3322
 <i>Measured Dosimetry :</i>	Total Ionising Dose in [Gy] (water)

<i>Dosimetry Procedure :</i>	ESCC 22900 section 4.1.1 TEC-QEC/PR001 - Appendix D (Total Ionising Dose accredited by RvA according to ISO/IEC 17025.2005 Certificate No. L517)
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(With the exception of the above specified dosimetry equipment, ESTEC ⁶⁰Co Facility does not assume any liability for the calibration status of any other equipment lent to the requester)

Irradiation Test Campaign Details

Source Activity : 79.8 TBq

on date : 15 February 2012

	units	Min.	Max.	Time-weighted Average										
<i>Temperature</i>	°C	24.10	25.70	24.99	Dosimeter position relative to ⁶⁰ Co source <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 10%;">X</td> <td style="width: 10%;">cm</td> <td>130</td> </tr> <tr> <td>Y</td> <td>cm</td> <td>736</td> </tr> <tr> <td>Z</td> <td>cm</td> <td>62</td> </tr> </table>	X	cm	130	Y	cm	736	Z	cm	62
X	cm	130												
Y	cm	736												
Z	cm	62												
<i>Pressure</i>	mbar	982.60	1036.30	1014.74										
<i>Relative Humidity</i>	%	22.20	42.90	32.08										

Run	Start Date & Time (CET)	End Date & Time (CET)	Total Ionising Dose [Gy] (water)	Dose Rate [mGy/h] (water)
1	15/02/2012 15:18	15/02/2012 15:54	0.25	0.41
2	15/02/2012 16:16	16/02/2012 09:13	7.02	0.41
3	16/02/2012 09:18	16/02/2012 11:10	0.77	0.41
4	16/02/2012 11:20	17/02/2012 13:28	10.80	0.41

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5	17/02/2012 13:33	17/02/2012 15:33	0.82	0.41
6	17/02/2012 15:42	20/02/2012 09:08	27.02	0.41
7	20/02/2012 09:18	20/02/2012 11:11	0.78	0.41
8	20/02/2012 11:23	20/02/2012 13:49	1.00	0.41
9	20/02/2012 13:55	20/02/2012 15:16	0.55	0.41
10	20/02/2012 15:21	21/02/2012 09:36	7.47	0.41
11	21/02/2012 09:43	21/02/2012 10:58	0.52	0.41
12	21/02/2012 11:02	21/02/2012 14:00	1.22	0.41
13	21/02/2012 14:16	21/02/2012 16:14		
14	21/02/2012 16:35	22/02/2012 13:18	8.54	0.41
15	22/02/2012 13:28	22/02/2012 15:09	0.69	0.41
16	22/02/2012 15:17	23/02/2012 09:18	7.43	0.41
17	23/02/2012 09:25	23/02/2012 10:20	0.38	0.41
18	23/02/2012 11:09	24/02/2012 18:31	12.94	0.41
19	24/02/2012 18:33	27/02/2012 08:33	25.58	0.41
20	27/02/2012 08:47	27/02/2012 10:06	0.49	0.37
21	27/02/2012 10:12	27/02/2012 11:09	0.36	0.38
22	27/02/2012 11:11	27/02/2012 13:07	0.73	0.38
23	27/02/2012 13:10	27/02/2012 15:12	0.77	0.38
24	27/02/2012 15:16	27/02/2012 16:28	0.46	0.38
25	27/02/2012 16:31	28/02/2012 13:00	8.44	0.41
26	28/02/2012 13:10	28/02/2012 16:33	1.33	0.39
27	28/02/2012 16:36	28/02/2012 19:40	1.21	0.39
28	28/02/2012 19:42	29/02/2012 08:44	5.13	0.39
29	29/02/2012 08:48	29/02/2012 13:16	1.83	0.41
30	29/02/2012 13:18	29/02/2012 14:53	0.65	0.41
31	29/02/2012 15:06	29/02/2012 16:50		
32	29/02/2012 17:10	01/03/2012 08:36	6.30	0.41
33	01/03/2012 09:08	01/03/2012 14:03	2.01	0.41
34	01/03/2012 14:15	01/03/2012 16:29	0.92	0.41
35	01/03/2012 16:32	02/03/2012 08:50	6.70	0.41
36	02/03/2012 08:58	02/03/2012 17:29	3.53	0.41
37	02/03/2012 17:47	06/03/2012 09:02	37.75	0.43
38	06/03/2012 09:14	06/03/2012 09:15	0.00	0.31
39	06/03/2012 09:18	06/03/2012 10:36	0.51	0.39
40	06/03/2012 10:39	06/03/2012 11:44	0.43	0.40
41	06/03/2012 11:47	06/03/2012 13:56	0.85	0.39
42	06/03/2012 13:59	06/03/2012 14:49	0.33	0.39

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43	06/03/2012 14:52	06/03/2012 16:29	0.64	0.39
44	06/03/2012 16:35	06/03/2012 18:30	0.76	0.40
45	06/03/2012 18:33	07/03/2012 08:57	5.68	0.39
46	07/03/2012 09:01	07/03/2012 10:16	0.51	0.41
47	07/03/2012 10:23	08/03/2012 08:56	9.23	0.41
48	08/03/2012 09:06	08/03/2012 14:16	2.00	0.39
49	08/03/2012 14:29	08/03/2012 16:10		
50	08/03/2012 16:27	09/03/2012 09:19	6.90	0.41
51	09/03/2012 09:22	09/03/2012 11:40	0.94	0.41
52	09/03/2012 11:42	12/03/2012 13:22	30.14	0.41
53	12/03/2012 13:25	12/03/2012 15:53	1.01	0.41
54	12/03/2012 15:55	13/03/2012 09:04	7.00	0.41
55	13/03/2012 09:14	14/03/2012 08:49	9.23	0.39
56	14/03/2012 08:56	14/03/2012 11:37	1.05	0.39
57	14/03/2012 11:43	14/03/2012 17:04	2.09	0.39
58	14/03/2012 17:09	15/03/2012 09:02	6.48	0.41
59	15/03/2012 09:08	15/03/2012 09:37	0.19	0.39
60	15/03/2012 09:42	15/03/2012 15:00	2.07	0.39
61	15/03/2012 15:05	15/03/2012 17:14	0.88	0.41
62	15/03/2012 17:21	16/03/2012 10:24	6.68	0.39
63	16/03/2012 10:31	16/03/2012 16:01	2.15	0.39
64	16/03/2012 16:15	19/03/2012 09:08	26.46	0.41
65	19/03/2012 09:33	19/03/2012 09:35	0.01	0.40
66	19/03/2012 09:37	19/03/2012 10:23	0.31	0.41
67*	19/03/2012 11:22	19/03/2012 13:44	0.96	0.41
68	19/03/2012 14:02	19/03/2012 15:39		
69	19/03/2012 15:58	20/03/2012 10:19	7.32	0.41
70	20/03/2012 10:27	20/03/2012 10:47	0.14	0.40
71	20/03/2012 10:50	20/03/2012 11:09	0.13	0.41
72	20/03/2012 11:12	20/03/2012 12:45	0.62	0.40
73	20/03/2012 12:47	20/03/2012 13:39	0.35	0.41
74	20/03/2012 13:42	20/03/2012 16:29	1.10	0.40
75	20/03/2012 16:31	20/03/2012 17:40	0.47	0.41
76	20/03/2012 17:43	21/03/2012 09:08	6.13	0.40
77	21/03/2012 09:11	21/03/2012 10:22	0.49	0.41
78	21/03/2012 10:28	21/03/2012 10:45	0.12	0.40
79	21/03/2012 10:47	21/03/2012 11:27	0.27	0.41
80	21/03/2012 11:30	21/03/2012 11:52	0.15	0.40

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81	21/03/2012 11:54	21/03/2012 12:44	0.34	0.41
82	21/03/2012 12:47	21/03/2012 13:40	0.35	0.40
83	21/03/2012 13:42	21/03/2012 14:36	0.37	0.41
84	21/03/2012 14:38	21/03/2012 15:42	0.42	0.40
85	21/03/2012 15:44	21/03/2012 16:19	0.24	0.41
86	21/03/2012 16:21	21/03/2012 17:01	0.26	0.40
87	21/03/2012 17:05	30/03/2012 09:14	84.22	0.41
88	30/03/2012 09:24	30/03/2012 11:16	0.76	0.41
89	30/03/2012 11:20	30/03/2012 11:22	0.01	0.40
90	30/03/2012 11:26	30/03/2012 14:01	1.05	0.41
91	30/03/2012 14:05	30/03/2012 15:52	0.72	0.41
92	30/03/2012 15:56	30/03/2012 19:24	1.42	0.41
93	30/03/2012 20:03	30/03/2012 20:06	0.02	0.39
94	30/03/2012 20:09	30/03/2012 20:24	0.11	0.41
95	30/03/2012 20:27	30/03/2012 20:30	0.03	0.40
96	30/03/2012 20:32	30/03/2012 20:45	0.09	0.41
97	30/03/2012 20:49	30/03/2012 20:57	0.05	0.40
98	30/03/2012 21:21	02/04/2012 08:58	24.41	0.41
99	02/04/2012 09:01	03/04/2012 14:04	11.87	0.41
100	03/04/2012 14:22	03/04/2012 19:59	2.30	0.41
101	03/04/2012 20:05	03/04/2012 20:51	0.32	0.41
102	03/04/2012 20:57	04/04/2012 11:04	5.77	0.41
103	04/04/2012 11:07	04/04/2012 11:57	0.34	0.41
104	04/04/2012 12:02	05/04/2012 10:31	9.19	0.41
105	05/04/2012 10:37	05/04/2012 13:51	1.32	0.41
106	05/04/2012 14:11	05/04/2012 16:02	0.76	0.41
107	05/04/2012 16:04	10/04/2012 16:04	48.96	0.41
108	10/04/2012 17:38	11/04/2012 11:00	7.08	0.41
109	11/04/2012 13:32	11/04/2012 15:31	0.81	0.41
110	11/04/2012 15:34	12/04/2012 09:45	7.40	0.41
111	12/04/2012 11:06	12/04/2012 13:07	0.82	0.41
112	12/04/2012 13:35	12/04/2012 15:36	0.82	0.41
113	12/04/2012 15:52	12/04/2012 17:53	0.82	0.41
114	12/04/2012 18:08	13/04/2012 08:30	5.84	0.41
115	13/04/2012 08:45	13/04/2012 10:45	0.81	0.41
116	13/04/2012 10:57	13/04/2012 12:57	0.81	0.41
117	13/04/2012 13:10	13/04/2012 15:10	0.81	0.41
118	13/04/2012 15:24	13/04/2012 17:27	0.83	0.41

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119	13/04/2012 17:40	16/04/2012 08:39	25.59	0.41
120	16/04/2012 08:50	17/04/2012 15:26	12.41	0.41
121	17/04/2012 15:45	20/04/2012 10:10	26.90	0.40
122	20/04/2012 10:23	20/04/2012 10:24	0.01	0.38
123	20/04/2012 10:27	20/04/2012 10:37	0.07	0.39
124	20/04/2012 10:40	20/04/2012 10:41	0.01	0.39
125	20/04/2012 10:45	24/04/2012 11:20	39.04	0.40
126	24/04/2012 11:41	24/04/2012 13:39	0.80	0.40
127	24/04/2012 13:42	27/04/2012 11:00	28.03	0.40
128	27/04/2012 11:06	03/05/2012 11:36	58.37	0.40
129	03/05/2012 11:56	03/05/2012 13:20	0.55	0.40
130	03/05/2012 13:27	04/05/2012 10:15	8.38	0.40
131	04/05/2012 10:24	07/05/2012 13:22	30.16	0.40
132	07/05/2012 13:35	07/05/2012 17:30	1.57	0.40
133	07/05/2012 17:53	07/05/2012 18:50	0.38	0.40
134	07/05/2012 18:53	08/05/2012 10:58	6.46	0.40
135	08/05/2012 11:26	08/05/2012 12:46	0.54	0.40
136	08/05/2012 12:50	08/05/2012 17:00	1.67	0.40
137	08/05/2012 17:19	08/05/2012 18:25	0.44	0.40
138	08/05/2012 18:47	09/05/2012 10:51	6.47	0.40
139	09/05/2012 10:53	09/05/2012 12:02	0.46	0.40
140	09/05/2012 12:07	10/05/2012 14:36	10.62	0.40
141	10/05/2012 14:41	10/05/2012 16:12	0.60	0.40
142	10/05/2012 16:15	11/05/2012 14:19	8.86	0.40
143	11/05/2012 14:46	14/05/2012 15:41	29.25	0.40
144	14/05/2012 15:51	14/05/2012 16:15	0.16	0.40
145	14/05/2012 16:19	21/05/2012 12:34	65.65	0.40
146	21/05/2012 12:37	21/05/2012 15:36	1.20	0.40
147*	21/05/2012 16:11	21/05/2012 18:34	0.96	0.40
148	21/05/2012 19:39	23/05/2012 16:53	18.15	0.40
149	23/05/2012 17:14	25/05/2012 11:55	17.18	0.40
150	25/05/2012 11:57	29/05/2012 10:35	38.04	0.40
151	29/05/2012 10:38	29/05/2012 13:27	1.13	0.40
152	29/05/2012 13:34	29/05/2012 14:32	0.39	0.40
153	29/05/2012 14:35	31/05/2012 08:20	16.77	0.40
154	31/05/2012 08:23	04/06/2012 10:18	40.48	0.41
155	04/06/2012 10:31	04/06/2012 11:05	0.19	0.33
156	04/06/2012 11:08	04/06/2012 13:43	2.87	0.40

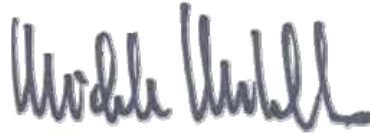
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157	04/06/2012 13:48	04/06/2012 15:27	1.14	0.33
158	04/06/2012 17:08	05/06/2012 08:58	6.04	0.40
159	05/06/2012 09:12	05/06/2012 11:04	0.41	0.40
160	05/06/2012 11:23	05/06/2012 13:45	0.54	0.33
161	05/06/2012 13:47	05/06/2012 17:24	1.04	0.29
162	05/06/2012 17:30	06/06/2012 08:45	3.83	0.25
163	06/06/2012 09:00	06/06/2012 10:06	0.24	0.22
164	06/06/2012 10:09	06/06/2012 11:12	0.24	0.23
165	06/06/2012 11:34	06/06/2012 14:16	0.59	0.22
166	06/06/2012 14:26	07/06/2012 08:44	3.73	0.21
167	07/06/2012 09:01	07/06/2012 11:04	0.78	0.38
168	07/06/2012 11:28	07/06/2012 16:33	1.93	0.38
169	07/06/2012 16:43	07/06/2012 18:23	0.70	0.42
170	07/06/2012 18:29	08/06/2012 11:03	6.40	0.39
171	08/06/2012 11:16	08/06/2012 13:01	0.67	0.38
172	08/06/2012 13:23	08/06/2012 17:54	1.72	0.38
173	08/06/2012 17:59	11/06/2012 08:54	27.18	0.43
174	11/06/2012 09:10	11/06/2012 11:09	0.80	0.40
175	11/06/2012 11:31	11/06/2012 13:21	0.73	0.40
176	11/06/2012 13:24	11/06/2012 14:21	0.38	0.40
177	11/06/2012 14:30	11/06/2012 14:55	0.15	0.37
178	11/06/2012 14:58	12/06/2012 08:45	6.70	0.38
179	12/06/2012 08:49	12/06/2012 09:30	0.25	0.37
180	12/06/2012 09:32	12/06/2012 11:11	0.62	0.38
181	12/06/2012 11:13	12/06/2012 11:53	0.25	0.37
182	12/06/2012 11:55	12/06/2012 13:50	0.72	0.38
183	12/06/2012 13:53	12/06/2012 14:51	0.37	0.38
184	12/06/2012 14:54	12/06/2012 16:40	0.67	0.38
185	12/06/2012 16:43	12/06/2012 17:32	0.32	0.39
186	12/06/2012 17:37	13/06/2012 13:55	8.06	0.40
187	13/06/2012 14:28	14/06/2012 10:15	7.89	0.40
188	14/06/2012 10:23	14/06/2012 11:20	0.38	0.40
189	14/06/2012 11:38	15/06/2012 09:55	8.89	0.40
190	15/06/2012 10:03	15/06/2012 10:53	0.33	0.40
191	15/06/2012 11:06	18/06/2012 09:24	28.04	0.40

Note: The uncertainty budgets (according to TEC-QEC/PR001 section 12) are: 4.2 % ($k=2$) for absorbed dose to water and 4.4% ($k=2$) for absorbed dose rate to water

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Notes: * Runs 67 & 147 without dosimetry. Dose rate taken from previous run with dosimetry.
Runs 13,31,49 & 68 – no dosimetry – devices out for measurements



Bob Nickson/Michele Muschitiello
(TEC-QEC Radiation Test Engineer)



Ali Zadeh
(TEC-QEC Section Head)

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RADIATION TEST SUMMARY

 Irradiation Test Report Number : **20139b**

 Date : **18 June 2012**

Test Requester :	Name	Alter Technology
	Address	Avd. Tomas Alba Edison, 4 41092 Seville (SPAIN)
	Personnel present :	E Munoz Plaza, J Jimenez Carreira, E Bernabeu Torres
	Project/Cost Code :	TRP
	Devices/Components irradiated :	Linear Devices AD565AT,OP470,AD584,PM139X,REF02,OP27,UC1843
	Device/Component details :	AD565AT,OP470,OP27,AD565AT,OLH249,OLH449 66183-105,AD565AT,PM139X,PM139X,SOC5551,UC1846

(conditions and identification)

Dosimetry Chain used :	A
Dosimeter :	Farmer model 2680 – s/n 390
Gas Ionisation Chamber :	NE Type 2571 – s/n 2915
Measured Dosimetry :	Total Ionising Dose in [Gy] (water)

Dosimetry Procedure :	ESCC 22900 section 4.1.1 TEC-QEC/PR001 - Appendix D <i>(Total Ionising Dose accredited by RvA according to ISO/IEC 17025.2005 Certificate No. L517)</i>
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(With the exception of the above specified dosimetry equipment, ESTEC ⁶⁰Co Facility does not assume any liability for the calibration status of any other equipment lent to the requester)

Irradiation Test Campaign Details

Source Activity : 76.7 TBq

on date : 4 June 2012

	units	Min.	Max.	Time-weighted Average	Dosimeter position relative to ⁶⁰ Co source		
Temperature	°C	25.00	25.60	25.43	X	cm	-10
Pressure	mbar	996.40	1019.10	1008.25	Y	cm	231
Relative Humidity	%	31.20	40.50	35.64	Z	cm	0

Run	Start Date & Time (CET)	End Date & Time (CET)	Total Ionising Dose [Gy] (water)	Dose Rate [mGy/h] (water)
1	04/06/2012 17:08	05/06/2012 08:58	63.56	4.02
2	05/06/2012 09:12	05/06/2012 11:04		
3	05/06/2012 11:23	05/06/2012 13:45	9.47	4.01
4	05/06/2012 13:47	05/06/2012 17:24	14.52	4.02

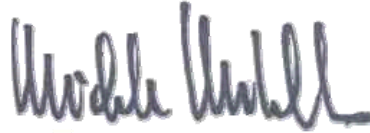
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5	05/06/2012 17:30	06/06/2012 08:45	61.25	4.02
6	06/06/2012 09:00	06/06/2012 10:06		
7	06/06/2012 10:09	06/06/2012 11:12		
8	06/06/2012 11:34	06/06/2012 14:16	9.51	3.52
9	06/06/2012 14:26	07/06/2012 08:44	71.58	3.97
10	07/06/2012 09:01	07/06/2012 11:04		
11	07/06/2012 11:28	07/06/2012 16:33	18.63	3.67
12	07/06/2012 16:43	07/06/2012 18:23	6.15	3.68
13	07/06/2012 18:29	08/06/2012 11:03	59.00	3.56
14	08/06/2012 11:16	08/06/2012 13:01		
15	08/06/2012 13:23	08/06/2012 17:54	13.66	3.02
16	08/06/2012 17:59	11/06/2012 08:54	212.74	3.38
17	11/06/2012 09:10	11/06/2012 11:09		
18	11/06/2012 11:31	11/06/2012 13:21	6.15	3.35
19	11/06/2012 13:24	11/06/2012 14:21	3.42	3.63
20	11/06/2012 14:30	11/06/2012 14:55	1.35	3.29
21	11/06/2012 14:58	12/06/2012 08:45	64.80	3.64
22	12/06/2012 08:49	12/06/2012 09:30	2.27	3.35
23	12/06/2012 09:32	12/06/2012 11:11	5.96	3.64
24	12/06/2012 11:13	12/06/2012 11:53	2.12	3.24
25	12/06/2012 11:55	12/06/2012 13:50	6.95	3.64
26	12/06/2012 13:53	12/06/2012 14:51	3.23	3.33
27	12/06/2012 14:54	12/06/2012 16:40	6.40	3.64
28	12/06/2012 16:43	12/06/2012 17:32	2.74	3.34
29	12/06/2012 17:37	13/06/2012 13:55	73.87	3.64
30	13/06/2012 14:28	14/06/2012 10:15	72.86	3.68
31	14/06/2012 10:23	14/06/2012 11:20	3.48	3.66
32	14/06/2012 11:38	15/06/2012 09:55	81.99	3.68
33	15/06/2012 10:03	15/06/2012 10:53	3.07	3.66
34	15/06/2012 11:06	18/06/2012 09:24	259.13	3.69

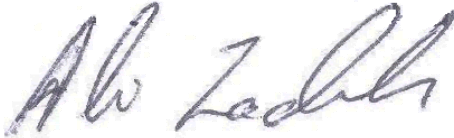
Note: The uncertainty budgets (according to TEC-QEC/PR001 section 12) are: 4.2 % (k=2) for absorbed dose to water and 4.4% (k=2) for absorbed dose rate to water

Notes: Runs 2,6,7,10,14 & 17 – no dosimetry – devices out for measurements

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ANNEX III ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE CONDITIONS

ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

Nº	SYMBOL	CONDITIONS ($T_A=25^{\circ}\text{C}$)	LIMITS		UNIT
			MIN.	MAX.	
1	$I_{C(ON)}$	$V_{CE}=5\text{V}$, $I_F=1\text{mA}$, $I_B=0$.	2.0	12	mA
2	$V_{CE(SAT)}$	$I_F=2\text{mA}$, $I_C=2\text{mA}$.	--	0.3	V
3	$I_{CE(OFF)}$	$V_{CE}=20\text{V}$, $I_F=0$, $I_B=0$.	--	100	nA
4	V_F	$I_F=10\text{mA}$.	1.4	1.8	V
5	I_R	$V_R=2.0\text{V}$.	--	100	μA
6	CTR1	$I_F=1\text{mA}$, $V_{CE}=5\text{V}$, $I_B=0$. Note 4.	--	--	--
7	CTR2	$I_F=2\text{mA}$, $V_{CE}=5\text{V}$, $I_B=0$. Note 4.	--	--	--
8	CTR3	$I_F=5\text{mA}$, $V_{CE}=5\text{V}$, $I_B=0$. Note 4.	--	--	--
9	CTR4	$I_F=10\text{mA}$, $V_{CE}=5\text{V}$, $I_B=0$. Note 4.	--	--	--
10	CTR5	$I_F=20\text{mA}$, $V_{CE}=5\text{V}$, $I_B=0$. Note 4.	--	--	--
11	CTR6	$I_F=10\text{mA}$, $V_{CE}=10\text{V}$, $I_B=0$. Note 4.	--	--	--
12	CTR7	$I_F=20\text{mA}$, $V_{CE}=10\text{V}$, $I_B=0$. Note 4.	--	--	--

Notes:

1. The limits included above are included herein for reference purposes only.
2. The standard microcircuit drawing also specifies post irradiation limits. They are not applicable to this characterization because the specified dose rate is out of range, but they will be considered in the final assessment, together with the limits included above.
3. ATN reserves the right to solder the parts to a substrate for the purposes of testing.
4. This parameter is not specified in the manufacturer datasheet, but is has been added according to customer requirements.